

VOL. XXVIII. No. 3

MARCH 1943

MECCANO

MAGAZINE



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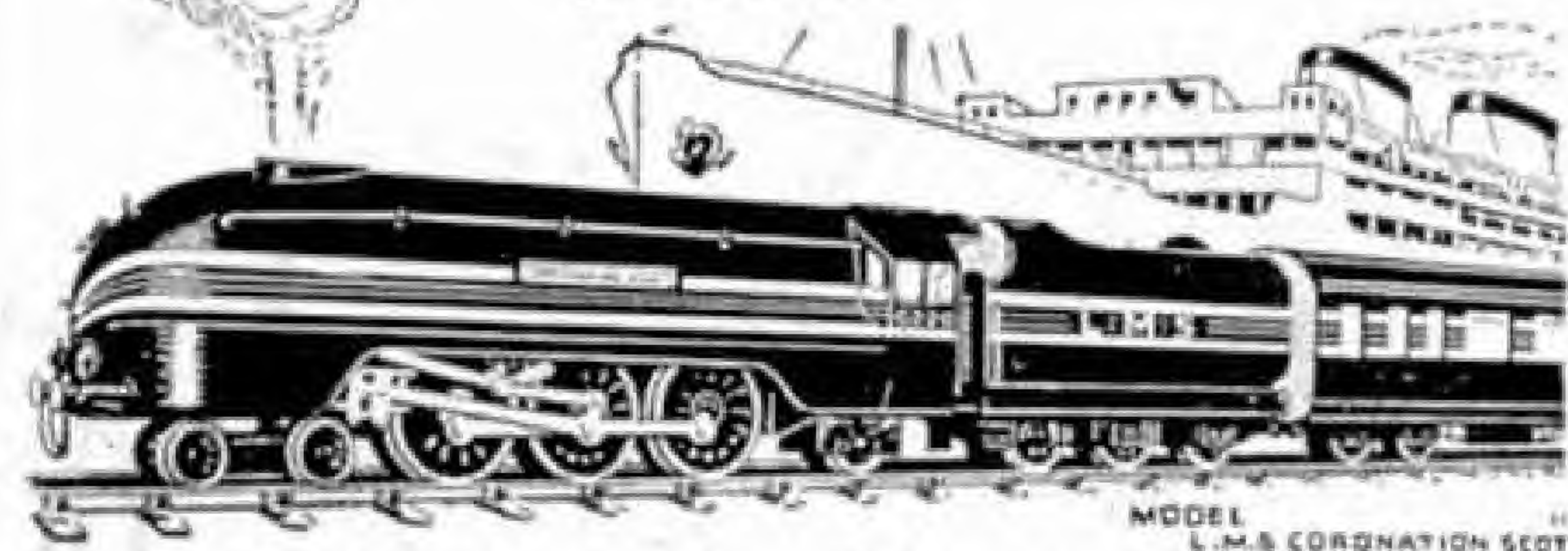
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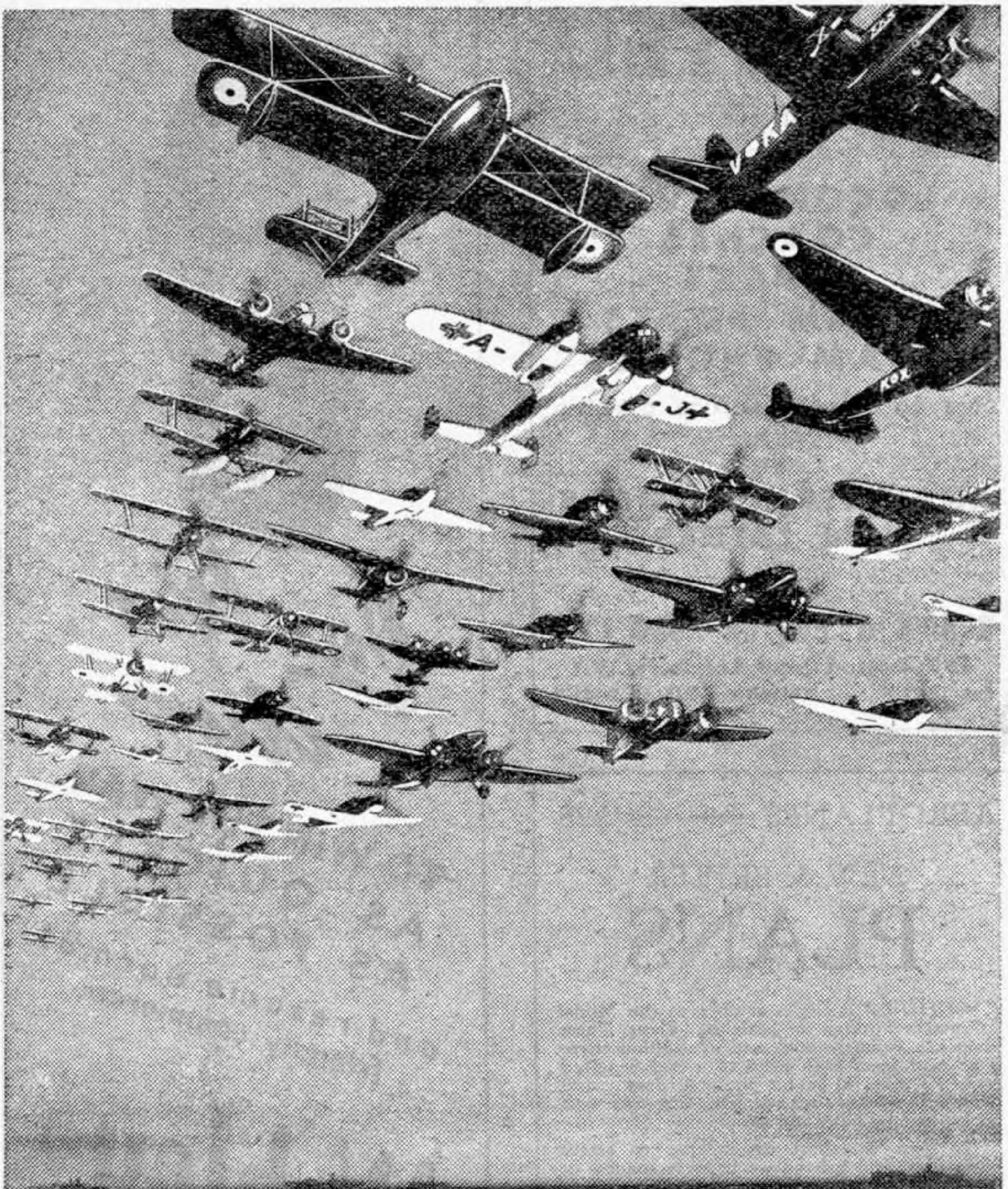
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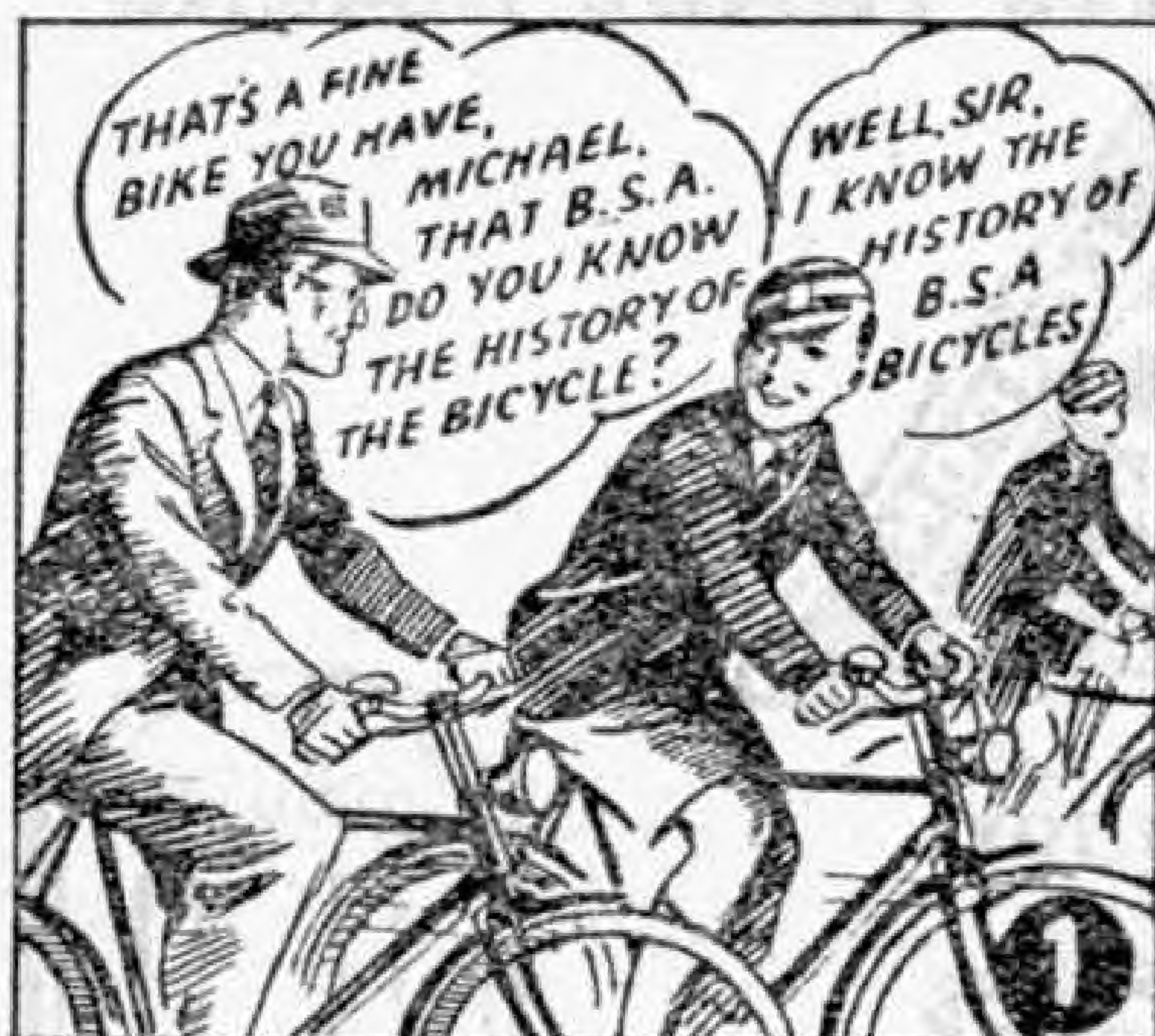
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MAGAZINE

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Vol. XXVIII
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March 1943

With the Editor

On a Canadian Footplate

This month's splendid story of a Canadian footplate trip by Mr. E. H. Livesay gives some interesting glimpses of the differences between Canadian and British practice. In the first place there is the great size of the Canadian engines. Then there is the tremendous mileage they cover in the course of a single run in the hands of several sets of enginemen.

Locomotive giants like these cannot be handled efficiently by standard British methods, and so we find that the enginemen are given various kinds of mechanical assistance. Prominent among these are the "iron fireman," or mechanical stoker; the feed-water heater; and the "booster," about which Mr. Livesay confesses to have become absent-minded! This last item is a small auxiliary steam engine that can be made to drive when required a normally idle pair of wheels, and thus help the engine to get away with a heavy train.

The work of the Canadian enginemen in their large and comfortable cabs is further eased by the power operation of such items as the reversing gear and fire-doors.

Leaders in the War Lord Louis Mountbatten

Lord Louis Mountbatten was born at Windsor in 1900, and educated at Osborne, Dartmouth, and Cambridge. He entered the Royal Navy as a Cadet in 1913, and during the 1914-18 war served in Admiral Beatty's flagships "*Lion*" and "*Queen Elizabeth*," and in submarines. He was flag lieutenant in H.M.S. "*Renown*" in 1920 when she took his cousin the Prince of Wales, now Duke of Windsor, on a visit to Australia and New Zealand. From 1926 to 1933 he held various wireless and signals appointments utilising his scientific skill; and from 1936 to 1939 he was attached to the Naval Air Division.

After an exciting time at sea in command of the destroyers "*Kelly*" and "*Javelin*" he was given, in October, 1941, the new job of Advisor on Com-

bined Operations, and so quickly proved himself to be the right man for this post that on 19th March 1943 he became Chief of Combined Operations. In this capacity he heads the planning of offensive operations involving all three Services, such as the St. Nazaire and Dieppe raids



Vice-Admiral Lord Louis Mountbatten, G.C.V.O.,
D.S.O., Chief of Combined Operations.

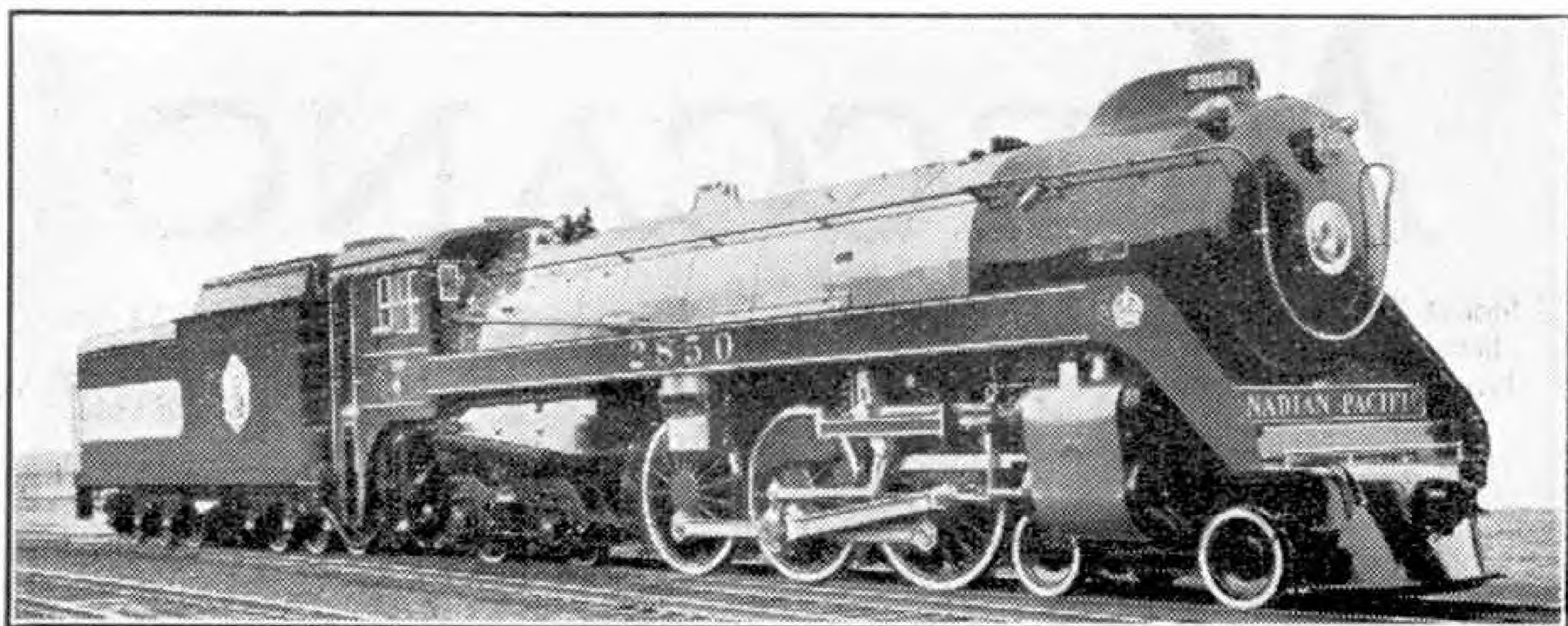


Fig. 1. No. 2850, the Canadian Pacific "Hudson" class locomotive that hauled the Royal train across Canada in 1939.

A Footplate Trip on the C.P.R.

By Edward H. Livesay

IT is a simple matter to cross Canada by train. You merely get into it at Halifax, on the Atlantic coast, and stay in it until you reach Vancouver, on the Pacific, 3,770 miles West, five days later—though you have to change cars at Montreal, and spend several hours there. This is when travelling by the Canadian National Railway route; the Canadian Pacific has another, from St. John. Countless people have taken this journey since the completion of the C.P.R. over half a century ago. I have crossed the continent in locomotive cabs! Nearly, that is. Truth compels me to admit that sleep was necessary sometimes, and that then I betook myself to a berth in the train. However, I can claim to have done 75 per cent. of the transcontinental trip on the footplate. This article deals with one section of the journey, the 419 miles from Fort William to Winnipeg, especially interesting because the engine was the C.P.R. 4-6-4 "Hudson," No. 2850, which hauled the Royal train right across Canada in 1939. The C.N.R. provided motive-power for the return trip.

First, something about the route, and the chief places concerned. The twin cities of Fort William and Port Arthur lie on the shore of Lake Superior. Coming into Fort William from the East, the track has been twisting, turning and snaking for hundreds of miles through the rocky wilderness of New Ontario, and along the northern shore of Lake Superior. Fort William is a Divisional point, where the engines that have brought the trains through from Toronto, 811 miles, come off. Leaving Fort William for the West, the train parts company with the lake, and plunges on for 294 miles to Kenora, by the Lake of the Woods, and thence across the Ontario boundary into Manitoba at Telford, where rocks and trees begin to disappear, sinking into the level prairie that continues for over 900 miles to Calgary, at the foot of the Rockies. Winnipeg is 81 miles beyond the Manitoba border, and 419 miles from Fort William. There are many considerable gradients in this distance, and though the actual overall rise is only 149 ft., there is an interesting peak at Raith of 967 ft., 53 miles from Fort William, and farther on several other little pimples too. It is a double-track route, much easier going East than West; how do you think that comes about? I will explain the puzzle later.

Now for the engine. This is of the 2800 H1d "Hudson" class, with a 4-6-4 wheel formation, and is a very fine-looking engine, as Fig. 1 shows. When

I made its acquaintance it had lost its colourful Royal trappings, and it is now running in the smart standard C.P.R. livery of chocolate and black, gold lined. The running-board, lower cab-sides and tender-panels are of the former colour; the smoke-box, wheels, etc., black. The crown just over the cylinders is now carried by all the 2800 class engines, but the Royal Arms on the smoke-box door and tender have been removed. The 4-wheel trailing truck, which is fitted with a booster, is necessary because the weight of the fire-box is too great for a single axle; "Pacifics" have largely disappeared in America for this reason. The booster is a small 2-cylinder engine—about 8 in. by 12 in.—driving the second axle of the trailing truck through gearing, and is brought into action at starting to give an additional "boost." It is cut out at or below 12 m.p.h., when its useful 10,000 lb. tractive effort is no longer needed. The gear-ratio is about $2\frac{1}{2}$ to one, and it is cut in or out by pneumatic mechanism.

Mechanical stoking is relied on, as the fire-box is far too big to make hand-firing possible. A 2-cylinder engine in the tender drives a worm-conveyor that brings the coal to a shelf just below the fire-door, where it is caught up by five steam-jets that spray it into the four corners and centre of the box. The quantity fed is regulated by the speed of the conveyor, and its evenness on the grate by the jets, and by a deflector that can direct it more or less to either side. The stoker is indispensable on these large engines, and does far better work than it is possible for the most skilful fireman to achieve by hand.

The Westinghouse brake and a Walschaerts valve-gear are fitted, and the boiler is domeless, a collector dry-pipe being substituted. Domes have been given up by the C.P.R., except in mountain territory, where steep gradients may affect the boiler water-level, and result in water being carried over into the cylinders. These are 22 in. by 30 in. The driving-wheels are 6 ft. 3 in. in diameter, and the tractive effort, with booster, is 57,250 lb. The boiler and fire-box are large, with a heating surface of about 5,000 sq. ft., a grate area of 81 sq. ft., and a working pressure of 275 lb. The driving axles carry 84 tons out of a total engine-weight of 163, and together with a tender carrying 21 tons of coal, and weighing 130 tons, the combined total becomes 293 tons.

Following a couple of days resting up in Fort William after a somewhat strenuous run of 24 hours and 792 miles from Toronto, most of it done in the cab

of No. 2839, an engine similar to No. 2850, I made arrangements to carry on with the same train No. 3, "The Dominion," to Winnipeg. It pulls out at 10.05 p.m., after a 20-minute stop, and I was down at the Depot in good time. After introducing myself to the engineer (driver, in English), who was going round the engine with lamp and oil-can, I climbed into the cab to make myself known to the fireman. We were all getting on a friendly footing and settling down nicely, momentarily expecting to hear the air-signal from the conductor (guard) to sound, when an official climbed into the cab and messed everything up. "Say, Mr. Livesay, she's running in two sections to-night—this is the first, with only six cars on, just mail and baggage. You'd better wait for the second; its got a diner and sleepers, and is much heavier. This outfit's no good to you—you want to see an engine work!" So down I had to get, with expressions of regret from the crew, both of whom were English. I was left to wait the arrival of the

the left of the fire-door are five little wheels (E) controlling the steam jets that blow the coal into the fire-box. The "butterfly" fire-door (F) is divided, hinged at the top, and opened by a pneumatic treadle; the long lever pointing to the left (G) holds the door open if necessary, otherwise it shuts when the fireman's foot leaves the treadle.

The cab is very well arranged and comfortable, and entirely enclosed. There are three seats, the engineer's being hidden by the locker on the right; the fireman's is out of the picture, as is also the third, used by the head brakeman when a freight train is being hauled, or by intruders such as myself. The cab is electrically lit by a lamp in the roof, round which is a shield with slots cut in it, through which pencils of light are projected on to the dials, quite obviating dazzle.

We have got under way by this time, with rapid acceleration, resulting from the two engines—or the booster, if it was there! The train was heavy, probably over 1,000 tons. The heavy, continuous up-grade makes it necessary for both engines to pull their socks up, if I may be allowed the expression, but that does not mean the fireman has to work correspondingly hard, as would be the case on a hand-fired engine. Miller merely looks through the inspection-holes into the whirling white flames in the fire-box, and occasionally turns the little jet-wheels, or perhaps gives the stoker-engine more steam. Through these holes you can see the coal coming on to a shelf just below the fire-door, to be caught up by the invisible steam jets and sprayed in an arching shower on to its flaming bed. It bursts into flame as soon as it leaves the shelf, and is largely burned in the air as it falls. The throttle was about two-thirds open, and the cut-off 35 per cent.

The riding of the engine was very good, and the track also was well cared-for. The 4-wheel trailing truck on these "Hudson" engines makes for easy action on the track. It is pivoted to a stretcher between the frames behind the rear pair of drivers. Being a double-header,

most of the responsibility for our safe-conduct devolved upon the other crew, and that left it open to Robertson and Miller to relax a little, and chat.

So No. 2850 roared on through the night to the first stop, for coal and water, at Raith, 53 miles from Fort William, which was made at 1.03 a.m.; the average speed had been 33 m.p.h. It does not sound much, but the whole stretch had been on a heavy up-grade, and the load, in spite of the two engines, no flea-bite. Besides, it was all the schedule called for—we were not out to break records. The "Pacific" came off here, leaving No. 2850 to carry on alone, and this it did, at 1.13 a.m.

During the run the grate had been rocked once or twice by a long detachable lever fitted over three stubs (H) that can be seen on each side of the floor in Fig. 2. They are lettered to indicate back, front, and centre, as the grate is in three sections. This breaks up clinker, much of which, with ash, drops through into the ash-pan, a much better way of getting rid of it than lifting it out through the fire-door with a long-handled shovel.

Ignace, a Divisional point, 147 miles from Fort William, was reached at 3.05 a.m., and here we all left the engine; Robertson and Miller to "turn around" and I to go back to the train and get some sleep.

The jarring of the brakes woke me up at 6.52—Kenora. I scrambled into my clothes, and made a dash for the engine, but there was no need to hurry; the "ground crew" was at work, raking out the ash-pan, using grease-guns and wrenches on the motion, etc., and the stop extended (Continued on page 106)

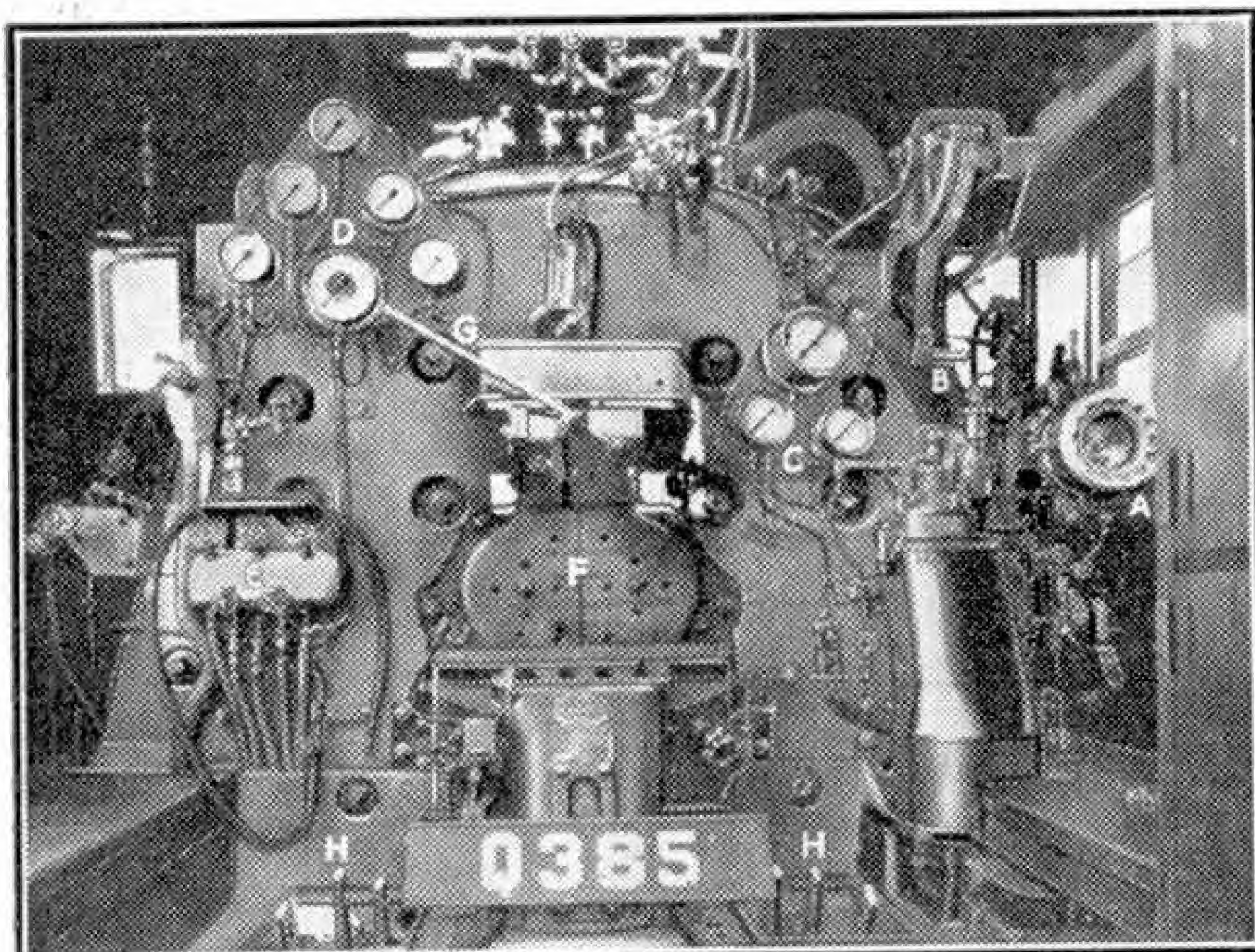


Fig. 2. Cab of a C.P.R. 2800 H1d "Hudson" class locomotive.

second section which turned out to be so heavy that it had to be a "double-header," with a "Pacific" in front, and to my gratification, No. 2850, the famous Royal engine, on the train. A second round of introductions made, I found myself installed in the cab with Engineer Robertson and Fireman Miller.

We pulled out at 11.27 p.m., into a night black as a pocket, the darkness occasionally lit up by lightning flashes. And now I am making a little confession. Whatever my locomotive articles may or may not be, I do try to make them a record of facts. So I have to admit I cannot remember whether No. 2850 had a booster or not! During the Royal Tour she certainly had, but it may have been removed since, as all the class do not carry them. However, it does not matter much; I have described the booster, and if you like to think it was there, well and good.

A few words about the cab and its fittings. Fig. 2 shows most of them; the engineer's are on the right and the fireman's on the left. The wheel with the serrated rim (A) is the reverse, air-operated. No effort is needed to work it; the little handle above it does the trick, and with a whirr the wheel spins, and the gear shoots forward or back, as required. Full valve-travel, from end to end, takes but a couple of seconds. The throttle-lever (B) hangs down from overhead, and is held in any position by catch and ratchet. To the left of the reverse are (C) brake controls, the gauges showing steam and exhaust pressure, and the brake dials. On the fireman's side are gauges (D) showing steam-pressure, steam-heat, stoker-engine pressure, feedwater pressure, etc. To

The Wizardry of Welding

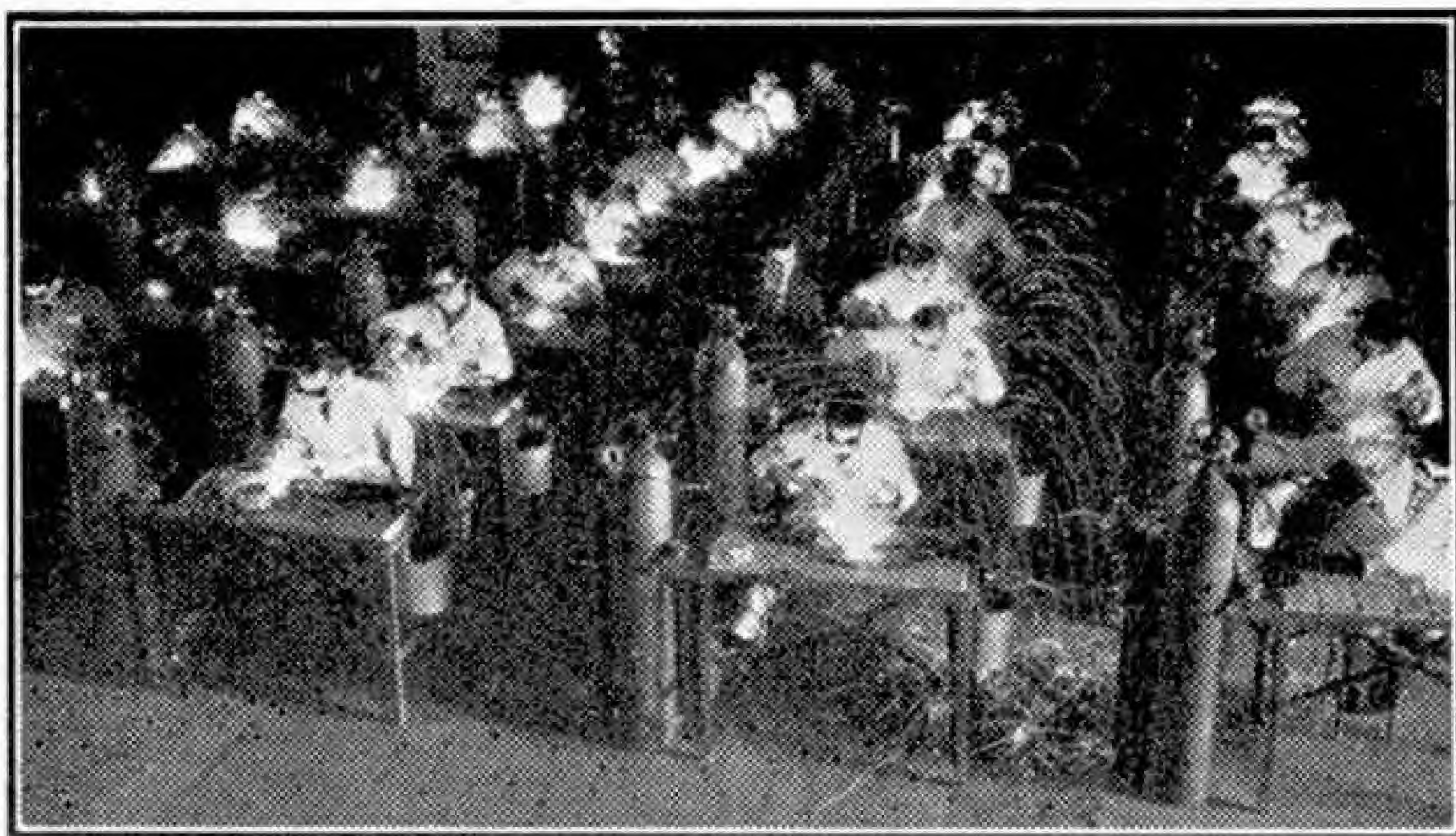
By C. W. Brett, M.Inst.W.
(Managing Director of Barimar Ltd.)

HUMAN life can be sustained only within comparatively narrow limits of temperature. We shiver at the mere thought of the zero figure, and find a hundred degrees in the shade almost overpowering. These extremes are roughly the average limits of normal experience in many parts of the world. Fewer than fifty degrees extension, either up or down the scale, and life would become extinct. With these thoughts in mind it is not easy to appreciate what it means to juggle

Strangely enough, relatively little is known about it outside engineering circles, yet it is vital to armament production, and a potent cure for damaged machinery and all types of ships maimed in the battle of the Atlantic or elsewhere. Welding does one thing splendidly—it unites metal. In this it is equally useful in peace and war, for dealing with new construction as well as repair work. The huge scheme of American ship construction depends largely upon welding for the almost incredible

speed with which fine vessels are produced. The hulls are neater, stronger and lighter than would be possible with riveted plates and angles; moreover every pound of steel saved is a valuable economy and represents an equivalent in extra cargo that can be carried.

It is unforgettable to witness repairs in progress. Each operator concentrated upon his allotted task appears to be having a private firework display. Sparks



A few keen trainees at a special welding school.

with heat ranging up to 8,000 deg. F., yet scientists have succeeded in taming it to their will with such good effect that it is playing a vital part towards winning the war.

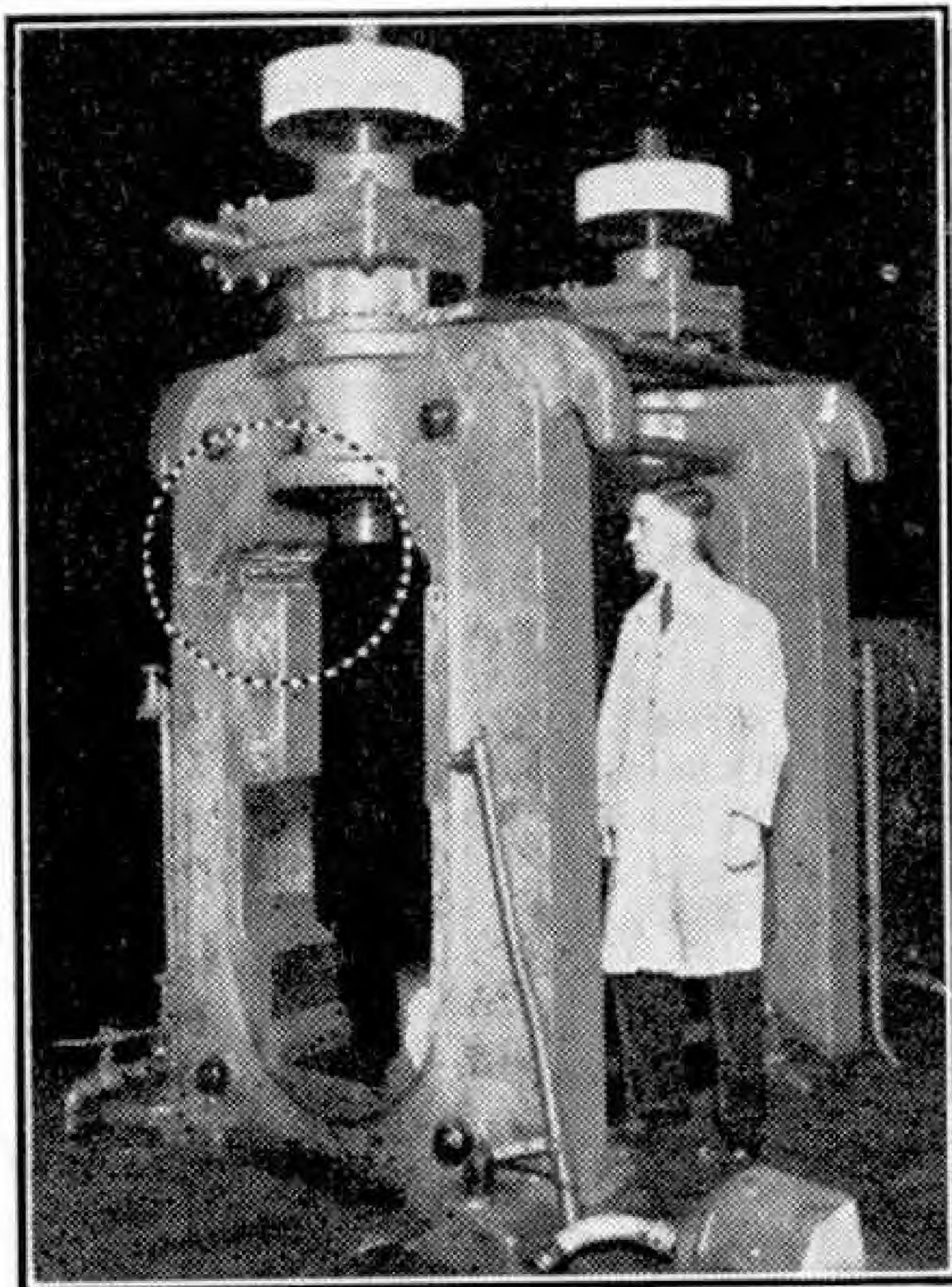
There are two chief ways in which intense heat can be produced. The electric arc is one, and burning oxygen and acetylene together is another. A third method, which has a limited commercial application, is the fusing of metallic compounds, of which some forms of incendiary bomb afford an illustration.

Davy discovered acetylene gas in 1836, but it was not until 1895 that Chatelier stumbled upon the hitherto undreamed of heat which could be obtained from it when burned in combination with pure oxygen. Chatelier at once realised a most important possibility in his discovery, for he commenced to weld pieces of metal together by making their edges molten.

Thus was the welding industry born.

shower from the intense point of light which seems to spring from the metal upon which he is working. His eyes, shielded by dark goggles or a grotesque mask which covers his face entirely, never waver. His hands, rock-steady, control the molten flow which makes two or more pieces of iron, steel or other metal a homogeneous whole.

Some of these men seem to be jig-saw puzzle enthusiasts as they patiently piece broken castings together before the final welding. If fragments are lost, which is quite common, then replacement sections are first made. It is during the winter months that this sort of job is most frequent, for a frost heavy enough to keep the plumbers busy can cause dire trouble to any water-cooled engine not safely guarded by draining or anti-freeze mixture when it is left standing. If ice is allowed to form it must occupy more space than water, and the force exerted in the process



A crack was detected in the main frame of a smaller type of rolling mill at the point shown inside the circle. A mobile welding plant, working alongside the mill, finished the job within four days, and the mill was ready for service.

is irresistible. The cylinder heads and blocks of motor cars and lorry engines are particularly susceptible. Countless thousands have been pieced together after multiple fracture; and with such skill is this done that not only is the original strength restored fully, but also the joins are invisible. It does not need much imagination to realise the value of such services with replacements hard to obtain and costing a very great deal more than a permanent repair by welding methods.

The same remedy is applied to all manner of worn and corroded parts, which are built up afresh with metal welded upon the defective areas and then machined to the correct size to within a thousandth part of an inch.

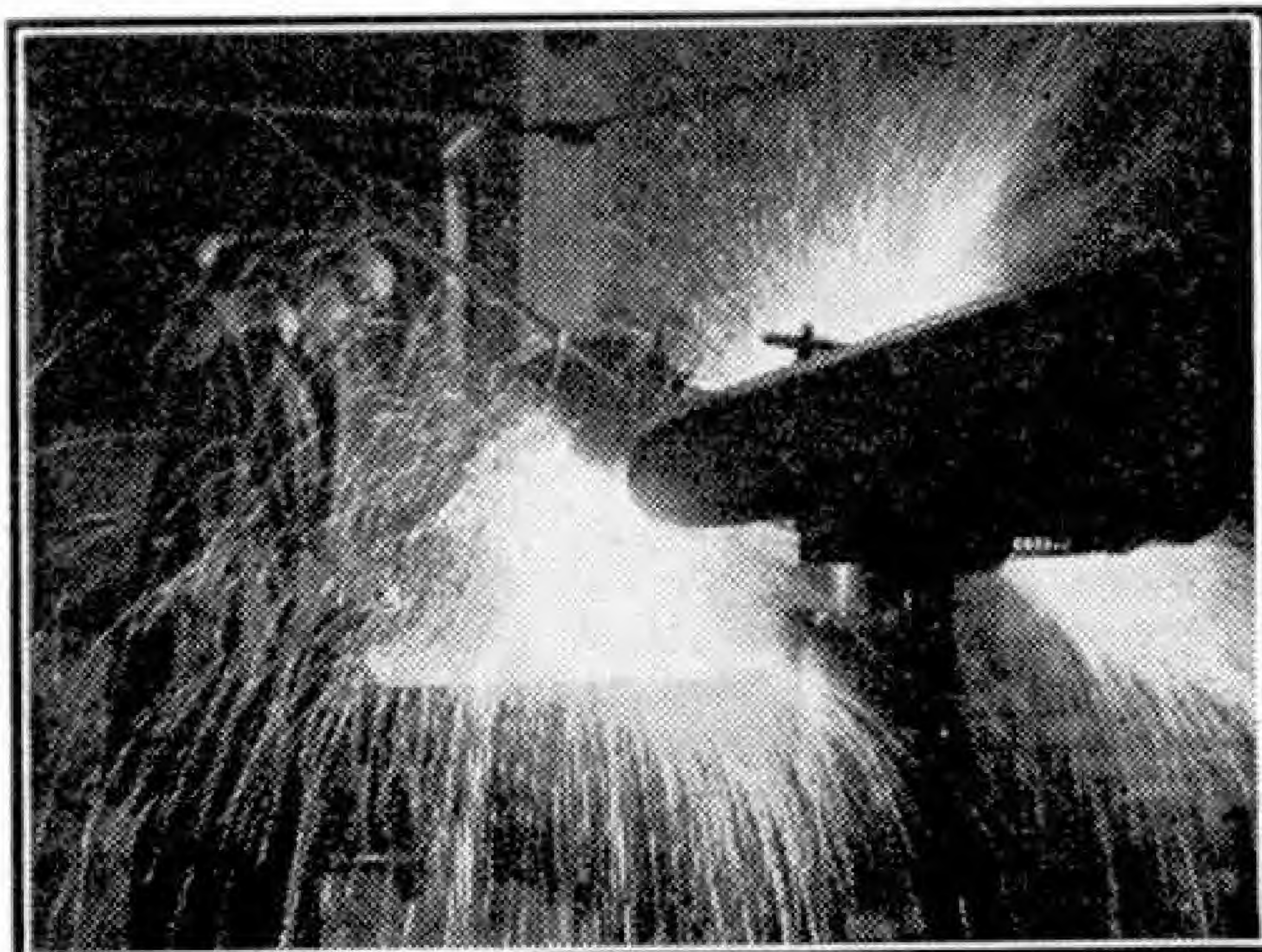
Those who are responsible for the maintenance of shipping have been set a pretty problem. In the Allied merchant fleet there are many craft the machinery of which was built in factories now under Axis domination. Spare parts are carried in accordance with regulations governing this point, but these supplies were never intended to meet maintenance requirements for an indefinite period. To maintain

cargo boats in reliable operation is no less important than producing new vessels; therefore something effective had to be done quickly. The difficulty has been overcome largely by welding science, which goes further than the normal reconditioning of existing parts, for it is used extensively to deal with damage resulting from enemy action.

To make certain types of new components is a slow and costly procedure, as, for example, the large cylinder heads fitted to Diesel engines. If cracks develop, these are quickly welded, the work being absolutely dependable.

Oxy-acetylene gas can be burned under water. Divers who want to cut away wreckage, or make a hole through steel big enough to allow them to pass, carry what is termed a cutting torch. It is remarkable to see this lighted equipment disappearing beneath the surface of the water which neither dims it nor makes its heat less intense. Around the flame bubbles are created, for the water boils as it envelops the flame it cannot quench. Steel is impotent before this tool, and it is cut like butter without appreciable physical effort on the part of the diver. Many lives have been saved and the salvage of hundreds of ships has been made possible by this method.

Munition and other factories engaged upon engineering work have not been slow to grasp the help of welding to solve machinery maintenance problems and to correct mistakes which are inevitable. Occasionally it is a broken part of a machine tool that needs attention, but more often a number of small parts are incorrectly shaped (Continued on page 106)



Welding and metal cutting with oxy-acetylene are among the most spectacular operations in shipyards and munition factories.

More about Airborne Troops

By C. G. Grey

Founder of "The Aeroplane" 1911, Editor until September, 1939

SOME time ago the Army was good enough, and I think very wise, to ask a bunch of war-correspondents and air correspondents of various papers to see a demonstration of the work of our Airborne Forces. The idea was that the correspondents should see how the parachutists and glider troops did their jobs—apparently in the hope that thereafter the said correspondents would not write the sort of rot that so often gets into the papers about anything to do with air.

Also among the guests was a big crowd of senior Army officers—Generals, Lieut. Generals, Major Generals, and lots of mere Brigadiers, many of them Canadians. That was a good idea, because they need educating in the use of airborne troops, with whom their men will have to co-operate. One of the troubles of the last war was that the Army never really understood what the flying people were getting at—and that has been a trouble in this war too—as for example at Dunkirk, when the Army complained that they hardly ever saw an R.A.F. machine. Which was because the R.A.F. was killing German dive-bombers by the hundred, 20 or 30 miles inland where the troops could not see them, so that the Germans never reached their targets.

At this demonstration I was glad to see that the Army had also invited several dozens of the people from the workshops where the gliders are made. That is the way to increase output by creating enthusiasm.

You have all read about the "briefing" of the crews of bombers, and how they are shown enlarged photographs of the "target for to-night." Well, the airborne troops are briefed in much the same way. But when time and local knowledge allows, they are shown "mock-ups," as aircraft builders would call them, of the ground they are to attack. These are large-scale

relief-maps built up of sand, showing the hills and valleys, and roads and woods and buildings, either in different coloured sand or in bits of wood or bricks. It is all most realistic, just like looking down on the country itself from a height of a few thousands of feet.

These airborne troops, as I said in an earlier article, are picked men with brains, so each of them has to be told what are the aims and objects of the operation. In the ordinary Army the company officers have the operation explained to them before going into action, and the men just go where they are put. Only the battalion

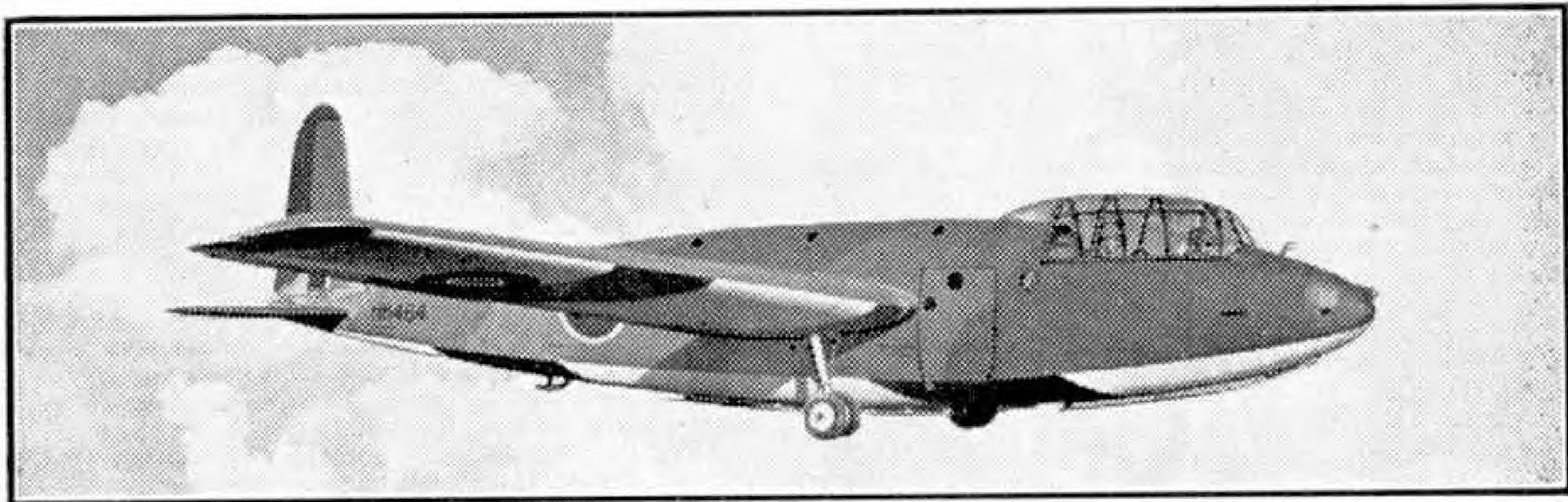


Airborne troops disembarking from a "Hotspur" glider and dashing to assembly point. The illustrations to this article are from photographs taken by Cyril Peckham General Aircraft Ltd.

and brigade commanders know a few days beforehand what is going to happen.

A fine example of the high intelligence and trustworthiness of our airborne troops was given in connection with one of their most important raids—that in which they captured the German radio-location station at Bruneval and destroyed it, in a grand Combined Operation. The men were briefed, they drew their special equipment from the Quartermaster Stores, and then something happened which delayed the operation for three days. They went about their ordinary jobs in camp and saw their friends and kept their mouths shut. And, not until they came back, and returned their special equipment to store, did their own Quartermaster, who had issued the stuff, know where they had been.

When we went to that party we were briefed along with the troops who were to



The General Aircraft "Hotspur," the first troop carrying glider to be designed and built in the British Empire.

take part in the mock battle, an attack on a spinney held by "German" troops and from there an attack on a ridge a mile or so ahead. The onlookers were transported to the spinney, so I suppose that we were reckoned as enemies. But before going there we saw the big "Horsa" gliders being hauled off by "Whitley" bombers—some wag suggested that they were so called because they needed a hawser as a tow-rope.

That getting off is tricky. The glider, as it is loaded less heavily than the bomber, gets off the ground first. Which means that if the glider pilot lets his machine go too high it pulls up the tail of the tug, or towing craft, and so the towing pilot cannot get his tail down to take off. If that happens the tug just trundles along on the ground till the pilot switches off. And then the glider, already up in the air, has to get down as best its pilot can.

In the early days, when old Hawker "Harts" were used in training pilots of small gliders, quite a lot of them finished up in the nearest hedge or clump of bushes because the glider would not come

down to let them get up. But I was told that few people were hurt, and gliders are cheap, and obsolete aeroplanes are without value, except as scrap, so they are worth as much after a crash as before it.

After watching the big gliders take off we were whirled away to the spinney, where, as "enemy aliens," we saw "sticks" of parachutists dropped near the tail of the wood, to capture a "German" post there. You will note that the airborne troops talk of sticks of parachutists, as the bombers talk of sticks of bombs.

Why a stick? The reason is that if you drop bombs in a bunch, or in a salvo, as it is called, they fall more or less on one spot, where they may do a lot of harm, or none at all. But if you drop them quickly one after another they will fall in a line, just as a walking-stick will fall if you put the point on the ground and let the head fall in a given direction. Thus you have a chance of doing damage along a line of buildings or transport or trenches, instead of missing the lot.

Parachutists have to drop in a stick, because one cannot push them out of a hole in bunches. And anyhow one wants to keep them clear of one another in descending. Some years ago, when parachutes were only looked upon as a way of escape from a damaged aircraft, I saw one man, at a demonstration of dropping from several machines at the same time, come down faster than a man below him and sit on the lower man's parachute. All that happened was that the lower one bulged inwards, like a cushion, and the man on top slid off. His parachute followed him. Both parachutes were deformed for a few seconds, much as when a man pulls a cord to guide himself in one direction, and both dropped more quickly. Then the air filled



Another picture of airborne troops landing from gliders.

them and they bounced apart and came down safely.

In due course the parachutists captured the "German" outpost, and the dejected prisoners—in tin hats and with hands up—were trotted past the onlookers. The British soldier loves play-acting, so they had to put on that show.

Then several gliders came down and decanted their troops and arms and ammunition and lots of equipment in front of us. And after that we were taken in a number of jeeps to the side of a wood from which the main attack was to begin. And the fun began too.

Our parachutists and glider troops had lined up in the wood and we, friendlies now and not enemies, were behind ropes at right angles to them. They began ranging on the hill to be captured, using 3 inch mortars brought in the gliders, and Bren guns opened on the scrub on the hillside, which might have hidden enemy troops. And, believe me, standing behind a rope watching Bren tracers squirting past a few yards away, and mortar shells howling overhead, feels odd at first.

Then our infantry trotted out of the wood in Indian file, while the Bren guns made lanes to cover them. If a man had walked out of the lane he would have been hit. Half a mile ahead, at the first scrub the infantry lay down and began firing, while some of the Brens and mortars lifted their fire ahead and others picked up their weapons and closed on the infantry. The brass-hats in their big Staff cars and we in the jeeps followed on.

Our drivers were sporting young officers, so the drive became a sort of jeep Derby, to see who could get the best place to see the next stage. All the time the mortar shells were singing overhead, and the Bren tracers began whistling past when we caught up with the new positions of the infantry.

In the next stage the troops ran into wire, great coils of that stuff that one sees wherever there is a road to be blocked or a point to be controlled. So a party of airborne sappers, covered by Bren guns and a smoke screen made by special mortar shells, went forward carrying some things like young torpedoes—they are called Bangalore Torpedoes, I believe, and if they were invented for Indian warfare in the Duke of Wellington's time, as the name suggests, I do not think that the Censor will object to our mentioning them. These were pushed into the wire, the sappers lighted their tails, and ran like blazes—just as boys ran after lighting a big firework, when the Fifth of November was not merely November the 5th. In a few seconds there was a boom like a big bomb, there was a huge cloud of black smoke, and there just wasn't any wire—so much better than creeping up on one's stomach and cutting it with nippers.

We drove through the gap where the wire had been, and the troops, who had gone through ahead, rushed a "tumulus," which was supposed to be the enemy's strong point. What the ghosts of the early Britons or Saxons underneath the tumulus thought would be worth knowing. But they were all fighting men, who died like sportsmen for their bit of Britain, or of Wessex of the West Saxons, so I expect that they thought it was good fun.

And those airborne lads evidently thought so too.

Thank goodness this country still breeds true to type, and has not gone all wet and pacifist and "conchie" in the past twenty years during which patriotism has been not merely out of fashion but officially discouraged. The way the youngsters join the Air Training Corps and the other cadet organisations is the best proof that our people are sound. And the way the Navy (Royal and Merchant) and the Army and the Air Force have fought shows that the men of 1925-1935 did not suffer from pacifist preaching.

I remarked to my cheery young driver that I was all in favour of a battle like this with one-way traffic. He grinned and replied that a bit of opposition made it more exciting. I hope that he finishes up as a General with lots of medals.

After the war was over for the day we were taken to see a heap of things which have been devised by the Airborne Forces for themselves, to be carried in gliders. And when one sees them one wonders

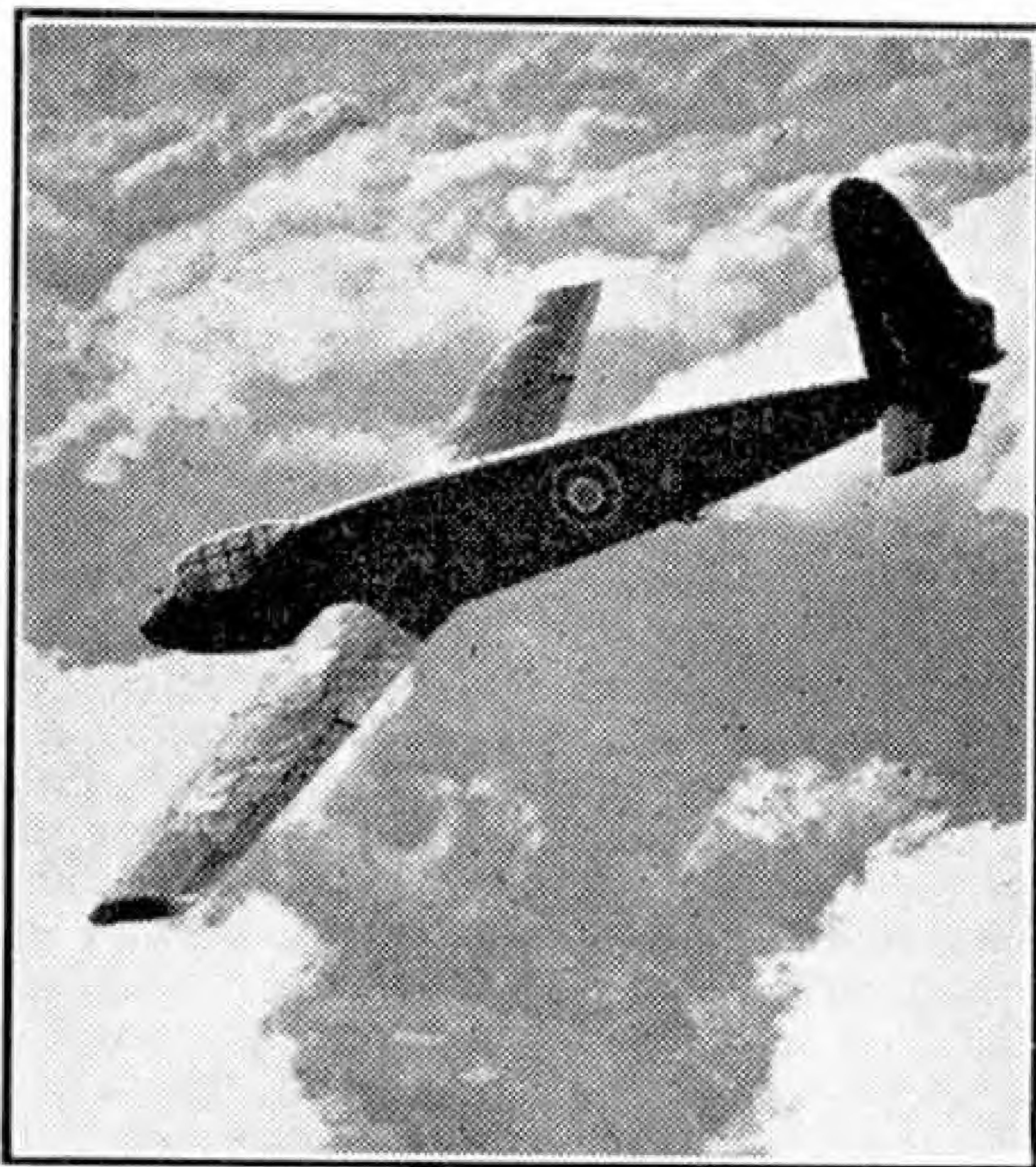
why ordinary Army (and Navy and Air Force) equipment is so cumbersome. Naturally one may not describe weapons, but other things may be allowed. The neat way in which bits and pieces are made to fit into seemingly impossible places would delight the heart of anybody who has really worked intelligently on a Meccano outfit. For instance there was a whole operating theatre, everything surgeons could want. And there was a kitchen outfit much better provided than that of most houses.

I remember when the Royal Flying Corps came into being in 1912 or so how surprised everybody was when the R.F.C. engineers produced a workshop lorry which could go to a crash and practically rebuild the machine or its engine on the spot.

Beside the latest thing in airborne repair outfits that lorry would look like a factory. You see, the Airborne Forces may well find themselves planted in places where vehicles cannot reach them, and they have to repair their guns and mortars and perhaps even aircraft. Something like that has been happening in Algiers and Tunis where the roads have been like pea-soup glue, or where there have been no roads at all to some of the places our troops have been holding. Then one may be able to land an airborne surgery or supplies and tools on a small flat patch and do very good work for troops who are not airborne.

Elsewhere I have said that the big idea of Major General Browning—the moving spirit of the Airborne movement—is to keep his highly trained men alive to kill enemy troops or capture key positions. He does not want them to run away to fight another day, but he does want them to live to fight another day. The Germans, in the fighting for Crete, just poured troop-carriers and parachutists on to the ground, treating the men as "cannon-fodder" in the way of German armies of the past. If there had been anything like a force of R.A.F. fighters on the spot, not one German machine would have reached Crete.

To have held Crete we should have had to prepare it as Malta or Cyprus were prepared. But the aerodromes were too small, and anyhow we had no fighters in the Middle East (Continued on page 106)



A typical "Hotspur" descent.

American Railways and the War Effort

Some Striking Figures

WE are all familiar with the tremendous contribution our home railways are making towards winning the war. The railways of the United States are equally on their mettle, and it will be of interest to see something of the magnificent work they are doing.

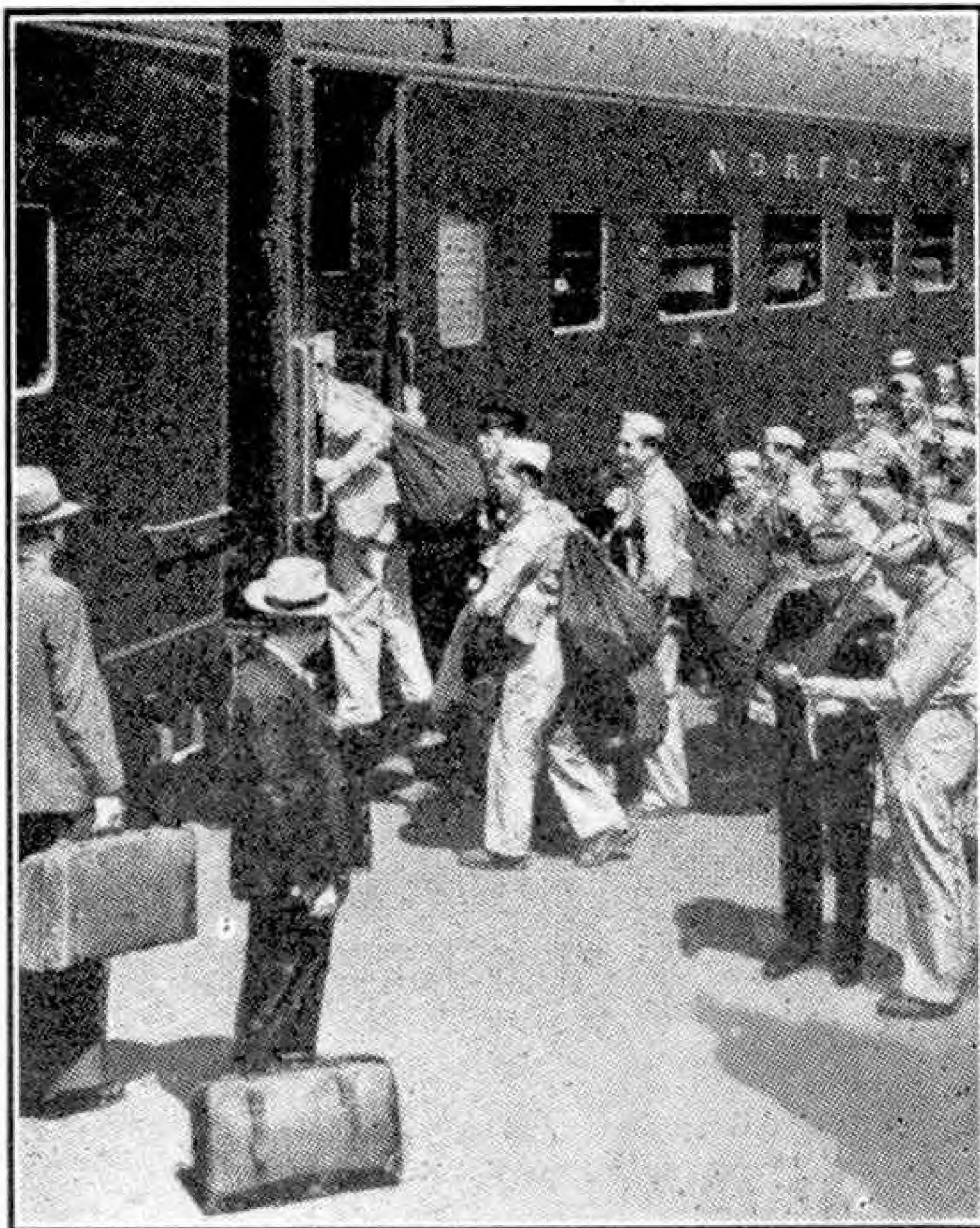
In less than seven weeks after Pearl Harbour 600,000 troops were moved within the boundaries of the United States. In the first five months of last year American railways handled in organised movements, not including men travelling on leave, approximately 4,500,000 troops within the continental United States—almost as many as were carried in the first 13 months of the period during which the United States took part in the first World War. In the same five months the level of railway freight traffic, as measured by tons hauled one mile, was 40 per cent. above the level of 1941, and 98 per cent. above that of 1939. In the first eight months of 1942 American railways moved an average of 1,250,000 tons of revenue freight one mile every minute of the day and night.

Our cover this month, based on a photograph in the *"Norfolk and Western Magazine,"* shows one of the fine N. and W. trains that are "rolling for victory." This train, by the way, is hauled by our old friend No. 600, whose building we described in our issue for November last. During the first seven months of 1942 the Norfolk and Western carried a total of 1,348,594 passengers an average distance of 130 miles each, representing an increase of 103.2 per cent. over the passenger mileage for the same part of 1941, excluding the movement of war industry workers in chartered trains.

A great improvement in economy of working has also been brought about. To move a ton of freight a mile, the United States railways as a whole burn one-third less fuel than they did in 1918; the Norfolk

and Western now move a ton of freight a mile with half the fuel they used in 1918.

On trains and in the passenger stations the slogan of American railway patrons is: "After you, Soldier!" As in this country, civilian passengers are cheerfully sacrificing



"After you, Soldier!" Photograph by courtesy of the *"Norfolk and Western Magazine."*

travelling conveniences so that the railways can move the Armed Forces adequately.

Before the war Hitler concentrated his attention as regards transport too much on building wonderful roads for high-speed motor traffic, to the detriment of his railway system. The German railway position becomes worse day by day, and the constant hammering of locomotives and rolling stock by British and American aircraft brings the crisis steadily nearer. In contrast, the railways of Britain and the United States are carrying out their war tasks with ever-increasing efficiency.

Air News

Success of Hawker "Typhoon" Fighter

The efficiency of the Hawker "Typhoon," the latest British high-speed fighter, was admirably demonstrated on 20th January last when machines of this type flown by pilots of the West Riding of Yorkshire squadron shot down five of 15 German aircraft destroyed during raids over Britain. Some of the victims were Messerschmitt Me 109s and others were Focke-Wulf Fw 190s. The following day another Fw 190 was shot down by a Flying Officer of this squadron. An earlier success of the "Typhoon" squadrons was the destruction of 11 enemy "sneak" raiders during the period 15-24th December last year.

The "Typhoon" is a low wing machine with a Napier "Sabre" liquid-cooled engine that develops about 2,350 h.p., and gives it a top speed of rather more than 400 m.p.h. It can be equipped with either machine guns or shell-firing cannon, or both, and is one of the most heavily armed and armoured fighters in service.

Bigger Flying Boats After the War

Squadron Leader H. M. McKenna, a director of Short Brothers, builders of the famous "Sunderland" and Empire flying boats, has indicated that there will be big developments in civil flying boat construction after the war. He said that his firm were considering the building immediately after the war of freight and passenger-carrying flying boats with an all-up weight of almost 100 tons. These aircraft would cruise at about 275 m.p.h. and carry enough fuel for a flight of about 3,000 miles. He added that the possibilities of flying boats of 200 tons, capable of carrying 100 passengers and of flying at speeds of 300-400 m.p.h. had been investigated.

By way of comparison it may be mentioned that the "G" class flying boat, a development of the Empire type, has an all-up weight of 33½ tons.

Fire Among the Bombs

Soon after dropping high explosive bombs on Turin a R.A.F. bomber crew had to fight a fire in the bomb compartment of their "Lancaster." "We were hit by 'flak' while we were making our bombing run," the pilot related afterwards, "but we took no notice, and dropped our bombs on the target. Then we closed our bomb doors, and started on our way home.

"Five minutes later the rear gunner saw flames shooting past him. I sent the flight engineer back to discover what had happened, but almost at once the bomb-aimer, who had looked through the front inspection panel, reported that the bomb-bay was full of fire and smoke. The 'flak' had hit one of the incendiary containers and set the incendiaries on fire. The heat had fused the release apparatus, and the incendiaries, which were blazing furiously, were hung in the bomb-bay.

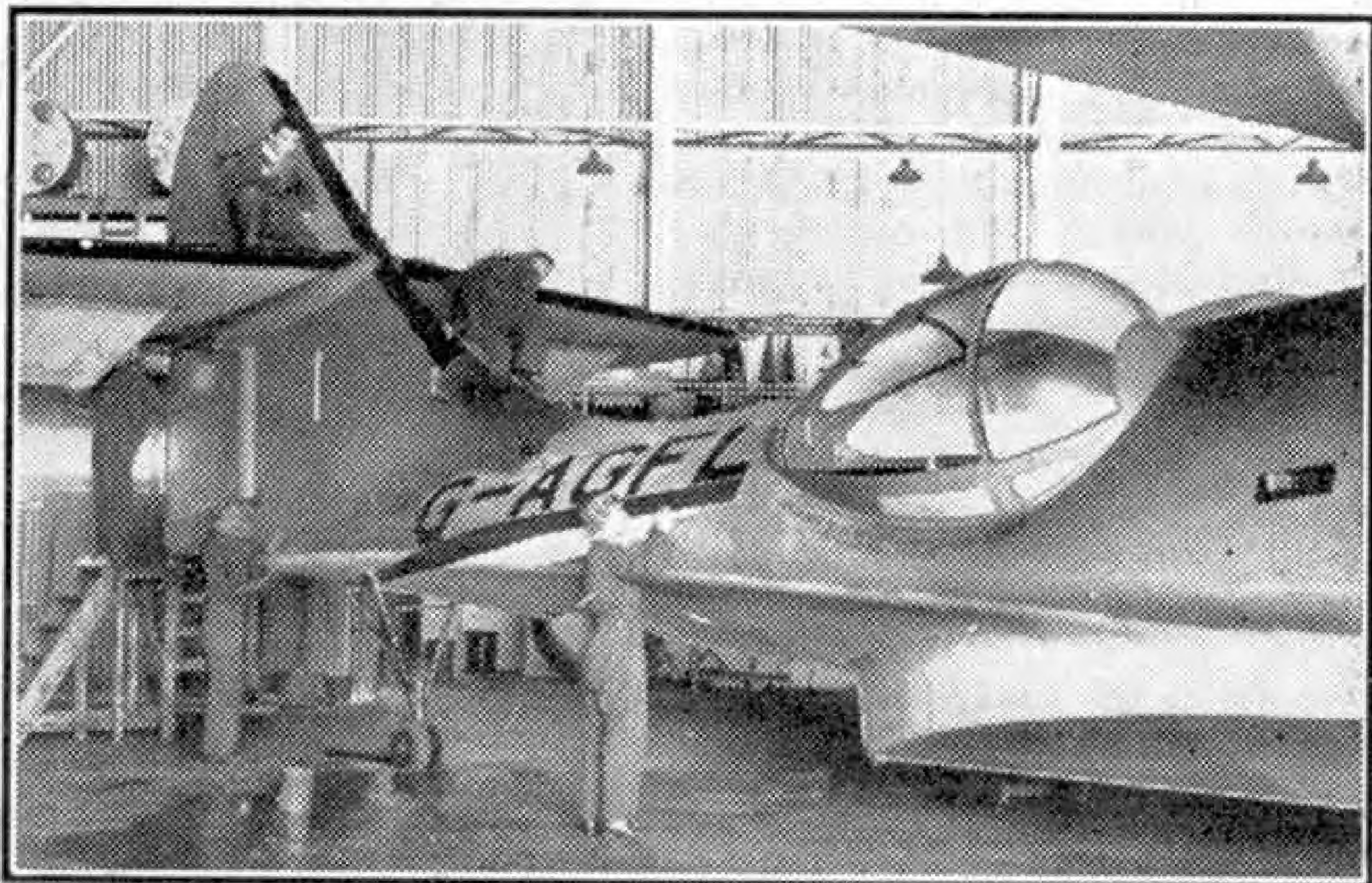
"I opened the bomb doors and tried to jettison the incendiaries, but without avail. When the bomb doors were open I could see the glare from the flames lighting up the wings and fuselage. Soon search-lights were after us, and the ground defences opened up. I closed the bomb doors. The flight engineer

then made a hole in the flare inspection panel with an axe and tried to put out the flames with a fire extinguisher. While he was doing this the matting on the floor of the fuselage caught fire, but the gunners quickly put it out.

"I tried to jettison the bomb containers, but the incendiaries remained blazing away in the bomb-bay. After the flight engineer had emptied four fire extinguishers he thought that the fire was out. To make sure, we again opened the bomb doors, and this time there were no flames illuminating the wings of the 'Lancaster.' The fire had lasted about 25 minutes." The pilot reached his own base, and made a normal landing.

Qantas Empire Airways Anniversary

Qantas Empire Airways recently completed 20 years of regular air line operation in Australia. It was in 1920 that discussions in Brisbane between P. J.

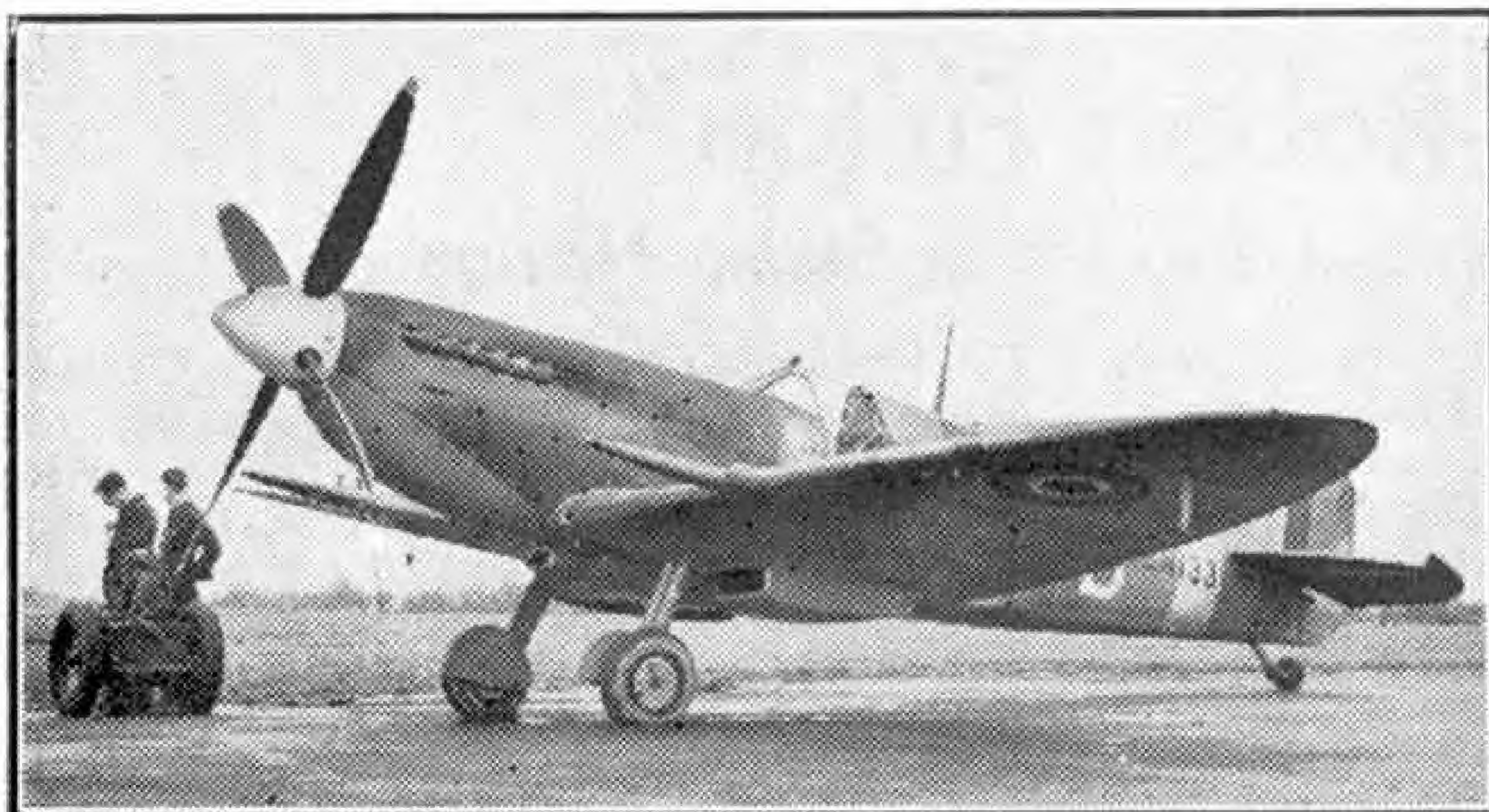


A Consolidated "Catalina" flying boat of British Overseas Airways at one of the company's marine air bases. (See special article on page 90). Photograph "The Aeroplane" copyright.

McGinnis and Hudson Fysh, who were pilots in the Australian Flying Corps in the 1914-18 war, and two Western Queensland sheep farmers, resulted in the formation of Queensland and Northern Territory Air Services—an unwieldy title that eventually was shortened to "Qantas," a word consisting of the initials of the original title. On 2nd November 1922, Pilot McGinnis, with Ground Engineer W. A. Baird, took off from Charleville, an inland town on the railway from Brisbane, for Longreach, on the opening stage of the new Qantas regular air service between Charleville and Cloncurry in Western Queensland, a distance of 577 miles. This was the second regular air service in Australia, the first having been introduced 11 months earlier by Western Australia Airways.

Nearly two years later, on 31st October 1924, cabin type aircraft were employed for the first time. The machine was a D.H. 50, with seating for four passengers. Mr. S. M. Bruce, then Prime Minister of Australia, flew in it from Winton to Longreach, with Mr. Hudson Fysh, the present Managing Director of Qantas Empire Airways, as pilot.

Airmen of lower rank than warrant officer, serving in launches of the Air/Sea Rescue Service, are to wear a special badge. The design of this incorporates the initials "A.R.S.," and shows a launch at speed.



This view of the latest version of the famous "Spitfire" fighter shows the slightly longer nose made necessary by the fitting of the Rolls-Royce "Merlin" 61 engine in this machine. Photograph "The Aeroplane" copyright.

Latest German Fighter-Bomber

Some interesting technical details of the Messerschmitt Me 210, the latest German long-range fighter-bomber, have become available since one of these machines was shot down over this country and has been repaired. The Luftwaffe is also using Me 210s on the Russian front and over the Mediterranean. It is an all-metal machine, and in appearance bears some slight resemblance to the British "Mosquito" bomber. As its classification indicates, it can be used either as a long-range fighter, for ground attacks, or as a dive-bomber. It is armed with six guns, two of which are 7.9 mm. fixed machine guns in the nose, and outboard of them are two 20 mm. fixed Mauser cannon, one on each side. The most interesting part of the armament, however, is a pair of 13 mm. machine guns mounted one on each side of the fuselage, just behind the wings, and remotely-controlled and sighted by the rear gunner. These rearward-firing guns can be moved about 35 deg. above or below centre, and thus can be trained downward for ground attack or to ward off pursuing enemy fighters. The bomb compartment is in the fuselage nose, under the pilot's cockpit, and a bomb load weighing up to 2,200 lb. can be carried.

There is a crew of two, the pilot who also acts as bomb-aimer, and the rear gunner who is also the wireless operator, and they sit side by side above the fixed guns. They are well protected by armour of which there is about 1,000 lb. in the machine. Armour plating is fitted behind and below the pilot's seat, and below the position for the rear gunner, who is also protected by a bullet-proof glass screen 2½ in. thick. Vital parts of the engine, and the engine radiators, also have armour protection.

The Me 210 has two 1,395 h.p. Daimler-Benz engines, and its top speed is estimated to be about 370 m.p.h. It has a range of about 1,500 miles.

British Airways "Ensign" Air Liners in Near East

Nine of the 14 Armstrong Whitworth "Ensign" air liners built for Imperial Airways are operating on British Overseas Airways' services in the Near East. They were originally fitted with four 900 h.p. Armstrong Siddeley

"Tiger" engines, but now have 1,100 h.p. Wright "Cyclone" engines, and fully-feathering airscrews. "Egeria," the last of these machines to go into service, was recently flown out to the Near East, a 5,000 miles air journey, by Capt. V. E. Flowerday. It had special long-range fuel tanks, and was shorn of its pre-war luxurious furnishings.

When a Compass Misbehaves

The compass in a bomber pilot's cockpit sometimes leads to a detailed investigation. When adjustments are made—"swinging the compass" it is called—mysterious deviations may be noticed, and the cause must be tracked down. The aircraft is turned slowly round to the magnetic north, and the compass checked. If the

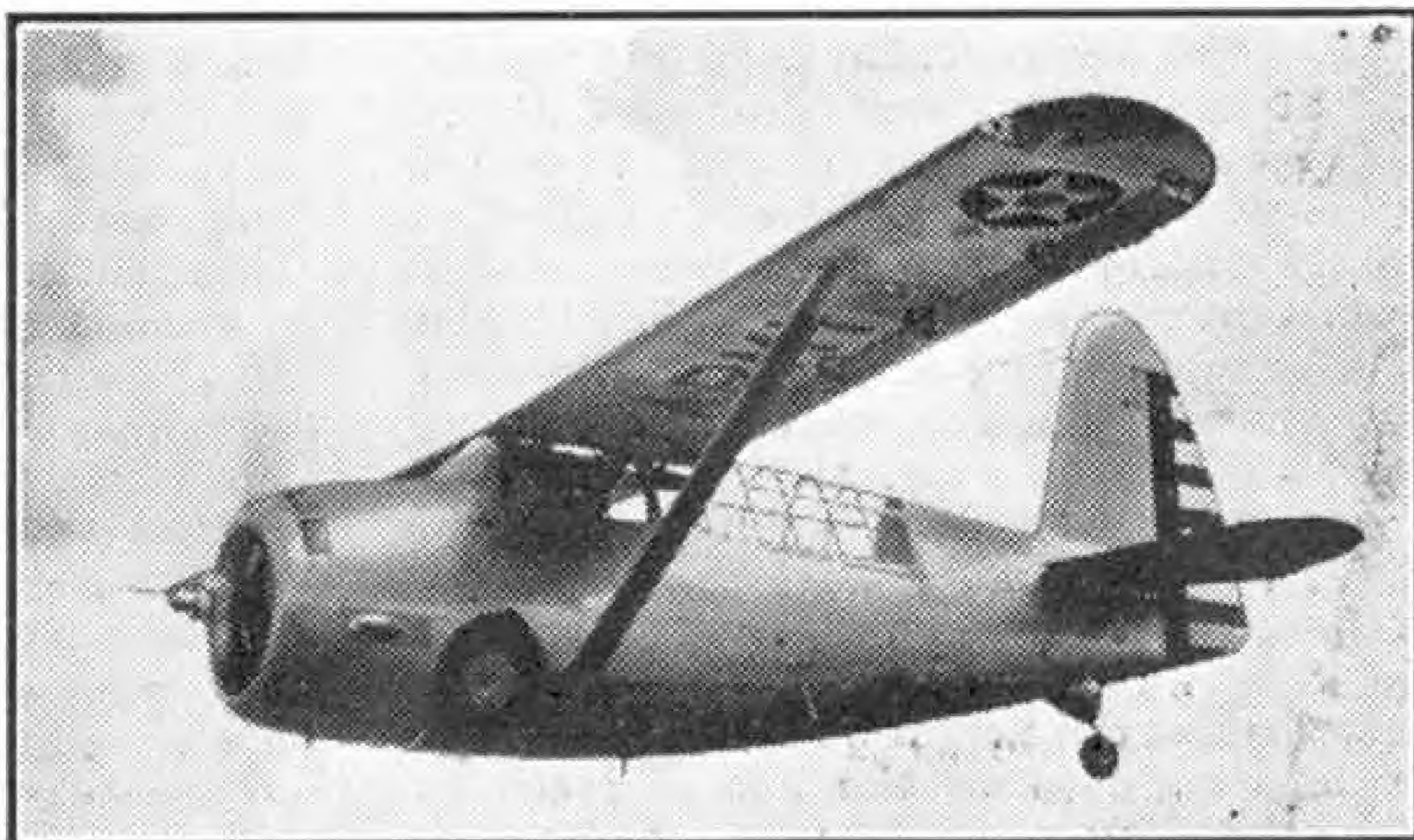
needle, or pointer, refuses to stay where it should, an inquiry of experts is opened.

The story is told on one bomber station of a navigation officer who, having cross-examined every witness about possibly hidden pieces of metal, and crawled about the aircraft on hands and knees, remarked: "Well, all I can think of is that it's caused by the magnetic personality of the pilot."

The explanation is usually much simpler than that. A knife may be found tucked down the flying boot of one of the men standing near. A metal stud that had become lodged in the heel of a pilot's boot has been known to affect the compass. Hours of investigation into the strange behaviour of a compass in a "Halifax" ended when the pilot discovered that a circle of wire used as stiffening in the inside of his hat was the cause of the trouble. When he went near the compass he got a bad reading, until in exasperation he flung off his hat, and then found that the compass's readings became accurate.

Lightning encountered during flight, a danger to any compass, may magnetise the aircraft. The compass must be "swung" every month as an aircraft gradually becomes magnetised.

The Douglas C-54 four-engined military transport has been named the "Airmaster." These machines are in service with the U.S. Army Air Forces.



A Curtiss O-52 Observation monoplane of the U.S. Army Air Forces. This type is ideal for Army Co-operation work, and carries a crew of two, pilot and observer. Photograph by courtesy of the Curtiss-Wright Corporation, Airplane Division, U.S.A.

Famous Engineers

Robert Fulton

First Commercial Success in Steam Navigation

ROBERT FULTON was born on 14th November 1765, at Little Britain, Pennsylvania, U.S.A., his parents both being of Irish extraction. His father died a year later, leaving a widow and five children poorly provided for. Robert was taught by his mother until he was eight, after which he attended a local Quaker school, where he does not seem to have distinguished himself in any way apart from showing ability for painting. At the age of 17 he went to Philadelphia. Little is known of his first two or three years there, but apparently by 1785 he was becoming known as a painter of miniatures. Among those whose portraits he painted was Benjamin Franklin, who became interested in the boy and got him many commissions. Fulton appears to have been fairly successful in his painting, for by 1786 he was able to provide financial help for his mother and his brother and sisters.

In 1786 Fulton decided to go to England, and at the end of that year or early in 1787 he arrived in London with about £40 in his pocket and a letter of introduction from Franklin to Benjamin West, then a prominent painter. He worked hard under West's supervision, and during the next five years achieved some success as a painter of portraits and historical pictures. Then, quite suddenly, in 1793, he abandoned art for engineering.

His first efforts were devoted to the design and construction of canals, which were then at the height of their popularity. He was opposed to the use of locks to overcome differences of levels, and in place of them advocated a system of inclined planes. He put forward a variety of canal schemes for England, and also wrote to

the President of the United States, George Washington, urging the advantages to America of his canal proposals. His efforts met with little success, however, and he came to the end of his resources. In 1797 he received financial help from a rich American, and went to Paris with

the object of developing his plans in France. He was granted a French patent for his system for 15 years. He then set about arousing interest among prominent people, and in May 1798 he wrote to Napoleon to explain his ideas, but without result. Soon afterwards he seems to have abandoned his French canal projects, and we find him turning his attention to the production of a submarine boat.

In 1798 Fulton submitted to the French Government designs for a submarine boat, intended to attach submarine mines, or torpedoes as Fulton called them, to the hulls of wooden warships. A boat was built to his plans in 1800 and

was to some extent successful, but it did not prove acceptable to the authorities. A second and improved submarine was built later, but this also failed to please the French. After an unsuccessful effort to interest the British Government in his ideas, Fulton turned his attention to the development of a practical steamboat.

In 1801 Chancellor Robert R. Livingston came to Paris as United States Ambassador. He had been attracted previously by the idea of steam navigation, and in 1798 had been granted sole rights to run steamboats on all waters in the State of New York for a period of 20 years. Livingston and Fulton met in Paris, and decided to tackle the problem together. Fulton's first boat was too lightly built to carry its engine, which broke through the bottom and sank.



Robert Fulton.

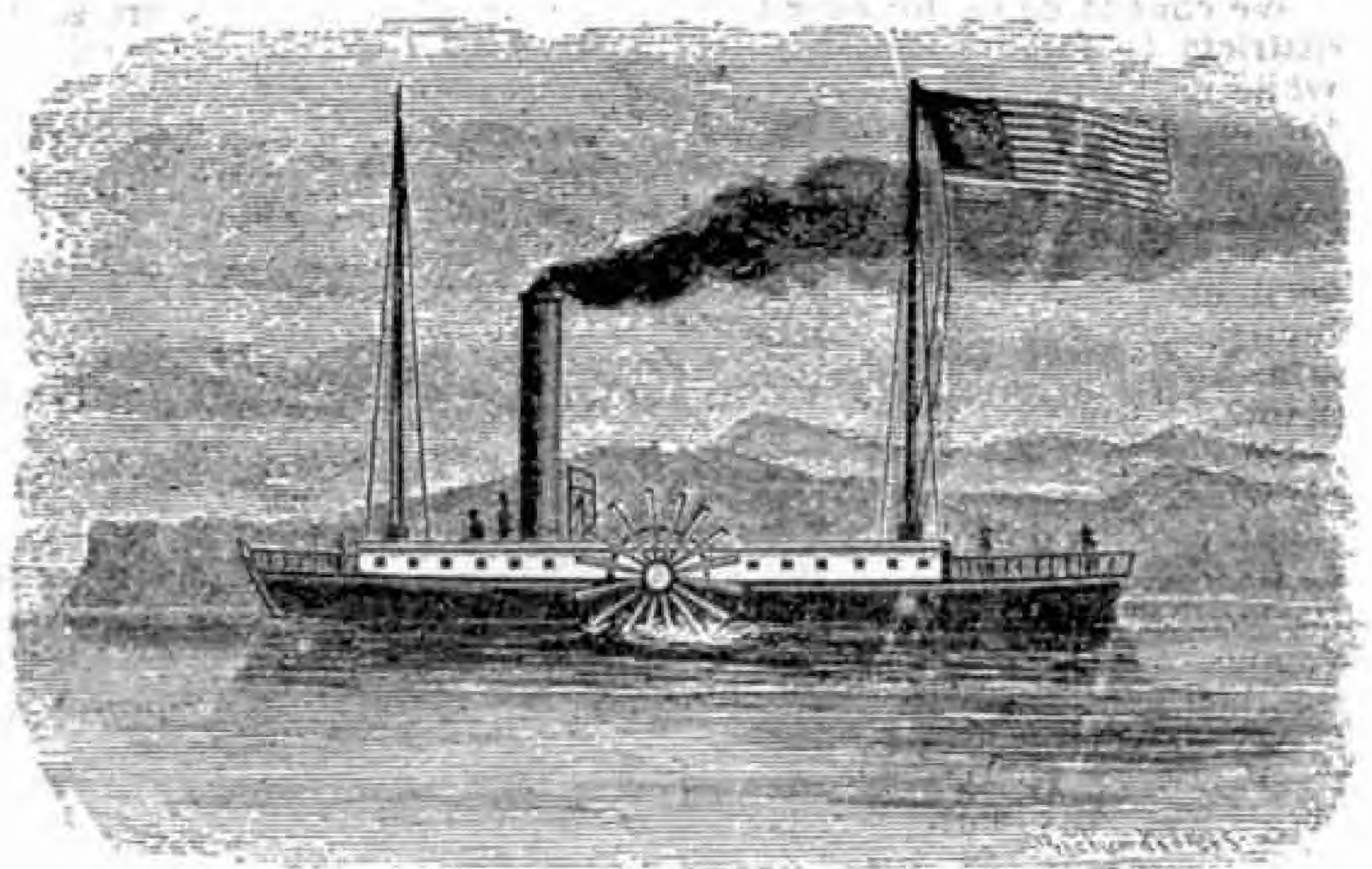
The engine was rescued undamaged and fitted into a larger and stronger boat, and on 9th August 1803 this made a successful trip on the Seine, during which it towed two boats at a speed of nearly 3 m.p.h. against the stream.

After this success Fulton and Livingston set to work in earnest to produce a steamboat that would enable them to take advantage of the latter's New York State Monopoly.

In 1806 Fulton returned to America, after ordering from Boulton and Watt at Birmingham an engine of 20 h.p. with a double-acting cylinder of 24 in. diameter with a stroke of 4 ft. This engine was shipped to America in 1805. Fulton gave great thought to the design of his first American boat. Her construction proceeded steadily, and although still incomplete in many respects she was ready for her preliminary trials on 9th August 1807, exactly four years from the trial of his early boat on the Seine. The trial trip took place on 17th August 1807 from New York to Albany, a distance of 150 miles, which was completed in 32 hours, the return journey taking 30 hours. A great crowd gathered to watch the proceedings, fully expecting that "*Fulton's Folly*" would be an utter failure. Their jeers turned to cheers, however, as the boat moved into midstream under her own power and set off steadily on her voyage.

This boat was known at first simply as the "*Steam Boat*," or the "*North River*

After certain changes and improvements had been made in her, the "*Clermont*" began early in 1809 a regular day service between New York and Albany. A second Fulton boat, "*The Car of Neptune*," was



The "*Clermont*," 1807.

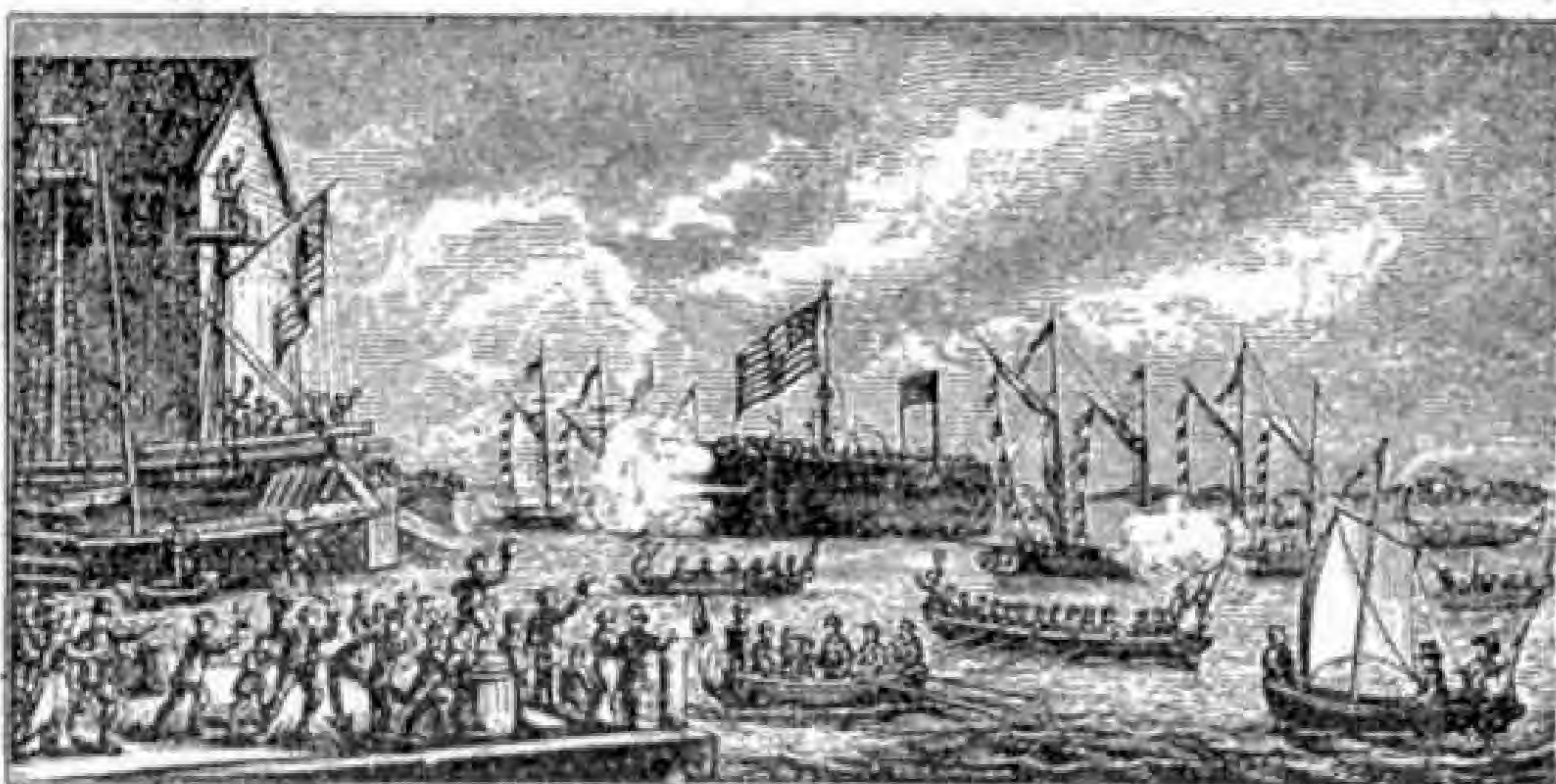
launched in October of the same year. Others followed in rapid succession until a small fleet was in operation and commercial steam navigation became established.

The last of the Fulton steamboats, the "*Chancellor Livingston*," which appeared on the Hudson in 1817, was the finest of the fleet. She was a remarkable vessel for her time. Her tonnage was 526, length 157 ft., breadth 33 ft. 6 in., depth 10 ft., and speed $6\frac{1}{2}$ m.p.h. She had three masts, three funnels forward of the paddle-boxes and between fore and main masts, and three decks for passengers. She was the first vessel to use coal as fuel.

Fulton's final achievement was the construction of the first steam-propelled warship, the "*Demologos*." This vessel had twin hulls with the paddle-wheels in between them, the idea of this arrangement being to provide protection for the propelling mechanism, and a steady gun platform. She was 167 ft. long on deck and 56 ft. in beam, and her sides were 5 ft. thick. Her main armament was to consist of thirty 32-pounders to fire red-hot shot. She was fitted with powerful pumps intended to

throw streams of water upon the enemy's decks to wet his ordnance and ammunition, and a submarine gun was to have been carried in each bow to discharge 100 lb. shot at a depth of 10 ft.

The "*Demologos*" was (Continued on page 106)



Launch of Fulton's "*Demologos*."

Steam Boat," but later was named the "*Clermont*" after Livingston's estate on the Hudson river. Her original dimensions were length 133 ft., breadth 13 ft., and draught 2 ft. Her two side paddle-wheels were 15 ft. in diameter and 4 ft. wide.

Engineering News

A Swedish Oil Plan

We cannot go on for ever boring holes in oil-bearing districts to find oil flowing naturally to the surface, while pumping and other expedients will only extend the oil age. Fortunately there is another source of oil that can be brought into use and is capable of yielding immense quantities when natural oil supplies are exhausted. This is oil shale, which has already been exploited in Scotland, where it is mined and brought to the surface, to be distilled in much the same manner as is coal in gasworks and coke oven plants.

Now a Swedish engineer has suggested that shale, of which there are immense deposits in his own country, should be treated underground. His idea is to bore vertical holes in the beds, and instal electric heaters in them in order to expel the gas and oil vapours. Other holes would be bored to serve as reservoirs for the vapours, which would be conveyed from them direct to condensers. It would be necessary to bore some 2,700 holes in an area of about six acres, and it is claimed that 30,000 tons of oil would be obtained from them. The Naerke oil shale beds of Sweden are believed to be capable of a yield of 100,000,000 tons of oil, and there are enormous deposits in many other parts of the world.

Engineers Fly Kites

Canadian and United States engineers concerned in the construction of a weir near falls in the Niagara River first had to overcome the difficulty of bridging the half-mile gap between the banks. The distance was too great to allow a rocket gun to be used, and neither a balloon nor an aeroplane was available. A kite therefore was flown across as soon as a favourable wind prevailed. It carried a fine wire, which was then spliced to a light cable, and this in turn was attached to a steel cable that was stretched between towers on the banks, to form a 2,600-ft. cableway, over which the necessary transportation of materials can take place.

Producer Gas for Ship's Engine

Readers of the "M.M." will already be familiar with the use of producer gas for driving motor vehicles, and it is interesting to find that the system has now been applied in Denmark to a 3,000-ton ship. In this vessel the producer gas is generated on board, by burning coal, and is employed in a 950-h.p. Diesel engine. The cost of this power plant is greater than that of the steam engine that otherwise would have been used, but there are many compensating advantages. For instance, it occupies less space, so that increased carrying capacity is available, and coal consumption is less, so that running costs are lower.

Russia's Greatest Dam Restored

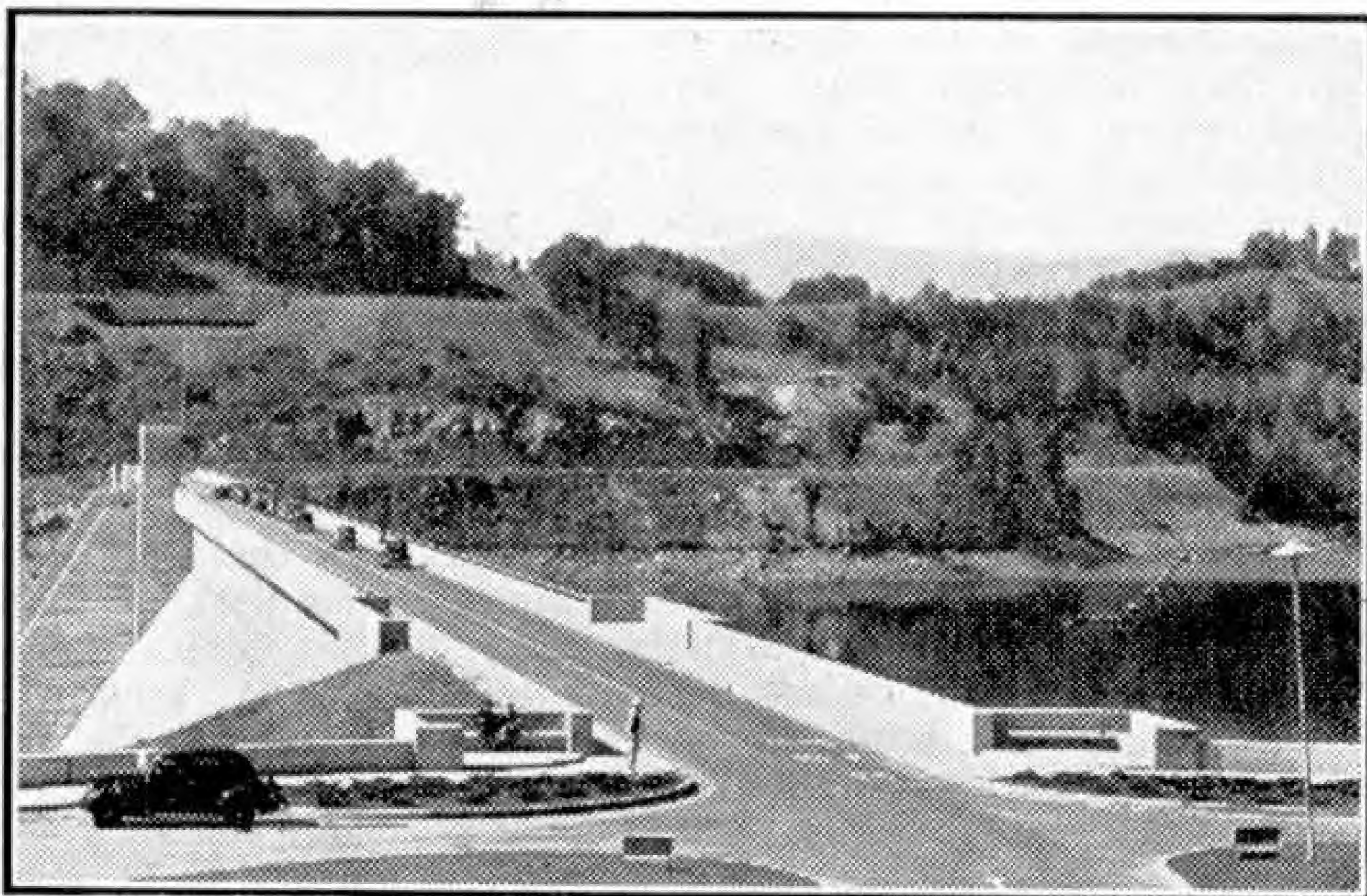
It is reported that the great Dniepropetrovsk power plant on the Dnieper River, destroyed by the Russians during their retreat in 1941, was restored by the Germans. The greatest difficulty encountered in this

work was the lowering of the water level behind the dam to allow reconstruction to begin. Galleries are said to have been driven through the undamaged portion, so that the water could flow away through them, and many thousands of tons of concrete were then used for the rebuilding, which is said to have been completed within a year.

At the time of writing the Russians have captured Kharkov and are threatening a further advance to the Dnieper, so that it looks as if the Germans have gained little benefit from their work on the dam.

Yorkshire Life-Boat Coxswain's Nine Decorations

Coxswain Cross, of the Humber Life-boat Station, has now won the Royal National Life-boat Institution's gold medal twice, its silver medal three times, its bronze medal twice, and its thanks on vellum, and he is the only life-boatman who has won the George Medal. Six of these nine decorations he has won during the war.



The roadway across the top of Norris Dam, with its 40,000-acre lake forming behind it. This dam was built by the Tennessee Valley Authority. It was completed in 1936 and rises to a height of 265 ft. above the bed of the Norris River. Photograph by courtesy of the Tennessee Valley Authority.

Coxswain Cross won his second gold medal for rescuing the crew of a trawler stranded by night on a sandbank. A gale was blowing and there were heavy snow-showers, with a six-knot tide running over the sandbank. The trawler lay smothered in the seas, which were breaking over her from all directions, and the life-boat had to go alongside 12 times before she had rescued the men. She was continually flung against the trawler, her mast was broken, her stem smashed and her planking holed.

The R.N.L.I. has also awarded its silver medal to G. Richards, the motor mechanic of the Humber vessel, bronze medals to the other five members of the crew and £5 each to the coxswain and crew.

Discharging Grain Train

An interesting grain conveyor capable of handling 80 tons an hour has recently been built between an L.M.S. station and an adjoining canal wharf. It has been installed as part of a scheme to enable grain to be handled equally well from ports on the east and west coasts. Grain arrives at the port in special hopper vans, of which there are 22 to each train, and is carried by the conveyor to barges in which it is taken to storage silos along the canal route.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 6d., for postage.

THE MECHANICAL WORKING OF STEEL

By DR. E. GREGORY and E. N. SIMONS
(Pitman. 10/6)

In this book the authors carry on the story of steel begun in their "*Structure of Steel Simply Explained*" and continued in "*Steel Manufacture Simply Explained*." The latter book gave us an account of the making of ingots and castings; we come now to the various processes through which most of this steel must pass before it is fabricated into usable parts.

Everyone knows that such operations as forging and rolling reduce the cross-sectional area of the steel, but it is not sufficiently realised that they bring about also a very real improvement in mechanical properties.

Forging is the process by which steel is changed in shape as the result of hammering, or squeezing under a pneumatic press, usually while the steel is hot. The village blacksmith with his hammer and tongs carries out hand forging; in power forging the blows are struck by a hammer driven by steam or compressed air. Then there is drop forging, in which the hammer head and the die, or anvil, are shaped so that the desired form of the forging is obtained, the hammer blow being struck by steam or compressed air, or by gravity alone, power being used only to raise the hammer for a fresh blow. Still another form of forging is known as machine forging, "up-setting," or "heading," typical products of which are bolts, nails, cap screws, etc. Hot-working of steel, in these and other forms, refines the grain structure, and thus leads to increased toughness. The temperature of the steel to be hot-worked is of great importance, and the authors explain why this is so, and give us a fascinating account of what happens to the metal under treatment.

From forging we pass on to rolling, which is one of the main processes by which steel is mechanically reduced in section. The general principle is similar to that of the familiar household mangle, but there is great variety in the arrangement and method of operation of the rolls. Pressing operates by means of a steady squeeze and is carried out by mechanical presses if the work is of fairly small or medium dimensions, or by hydraulic presses for larger pressings. The mechanical press ranges from 200 to 2,000 tons capacity. The hydraulic press can produce shaped parts of a size that no steam forging hammer could attempt, such as the huge propeller shafts of the "*Queen Elizabeth*" and "*Queen Mary*"; its range is from 200 to over 15,000 tons.

We have referred to the hot-working of steel; cold-working also plays a very important part in modern mass production. Heading, rolling and pressing can be carried out on cold material, and there is also the important process of cold drawing, in which the section of unheated steel rods, bars or coils is reduced by stretching or lengthening them. Cold-working processes involve special difficulties, but cold-worked steel has certain advantages. Its dimensions can be more accurately controlled; it can be given a smooth and bright finish; it has better physical properties for certain purposes, and it is more readily machinable.

The authors take us through many other important and interesting processes—bending; extrusion; thread

rolling, a comparatively recent process in which threads on screws, bolts, screw caps, etc., are produced by rolling under pressure; knurling, and spinning.

This book is in some respects even more interesting than its predecessors. In their preface the authors refer to "the man with 'the little black book' tucked carefully away in his pocket, who secretes such knowledge as he possesses and guards it jealously, refusing to transmit one iota of his rule of thumb experience to those who need it, surrounding with an aura of mystery and terror the details of his craft." Their object, they tell us, has been largely to defeat this enemy of progress, and in their fascinating account of what goes on "behind the scenes" they have certainly been successful.

ESCAPE TO FIGHT AGAIN

By A. P. LUSCOMBE WHYTE
(Harrap. 8/6 net)

The sub-title to this book, "*Stories of Men and Women who refused to accept Defeat*," gives the keynote of the adventures recorded. The stories are arranged in five groups. The first concerns members of the Forces who refused to become prisoners of war, and, often after incredible hardships, returned to their units. The next two groups tell of nationals of the countries over-run by Hitler who escaped under the

very nose of the Gestapo, and finally reached Britain. Parts four and five deal with British sailors and airmen who brought home their ships or aircraft, when by all the rules of common sense their craft should have been abandoned.

In spite of the similarity of the topic, these stories are extremely varied. All are of interest, and many of them are literally thrilling to read.

TABLE-TOP PHOTOGRAPHY

By HENRY G. RUSSELL, A.R.P.S.
(Fountain Press. 5/- net)

This is the most complete and practical book on table-top photography that we have come across. It treats the whole subject very fully, and the advice and instructions are obviously based on a great deal of experience. The half-tone illustrations are excellent, and the many line drawings in the text are very helpful in making various points clear. Readers who have followed the articles on table-top photography that have recently appeared in the "*Meccano Magazine*" will find this book of great interest, and it can be strongly recommended to all beginners in this art.

"THE A.B.C. OF SOUTHERN LOCOMOTIVES"

(I. Allan, 225-7, Laleham Rd., Staines. Price 1/-)

The title of this book admirably describes its purpose and contents, which will be of interest to all railway enthusiasts.

In the earlier pages all engines in service are given in numerical order with their classes. Then follows that delight of the budding enthusiast, a classified list of named engines. Finally, neatly collated, there are given by classes, in alphabetical order, details of wheel arrangements, some dimensions, designer's names and dates of construction. A novel and welcome introduction in a book of this kind is the details of the nicknames of various classes.

Owing to wartime difficulties, it is impossible to guarantee prompt delivery of books ordered as described at the head of this page, but every effort will be made to ensure speedy despatch.

Railway News

War Effort of the "Nelsons"

Although passenger train loads on the Southern Railway's main lines rarely approach the peak figures which have won such publicity for the two Northern systems, the majority of S.R. expresses are normally loaded well up to pre-war maximum standards. Under these conditions much of the work performed approaches closely to pre-war levels in speed also, whilst in the attainment of much that is meritorious no single locomotive class is more prominent than the famous "Lord Nelson" 4-6-0s, as the following examples testify.

On the war-time counterpart of the "*Atlantic Coast Express*," No. 851 "*Sir Francis Drake*" recently took a trainload of 435 tons gross out of Waterloo in wet and sleety conditions; on restarting from Woking the engine attained 48 m.p.h. up the 1 in 314 past Brookwood, and was then badly slacked through Farnborough. From this point to Tunnel Junction, Salisbury, the 49.5 miles were covered in 48½ min., an average of more than a mile-a-minute being maintained without the maximum speed rising above 70 m.p.h. Thus, in spite of the 2-min. delay by p.w. operations, the 59.4 miles Woking to Salisbury were completed in exactly 66 min., representing an actual gain on schedule of 4 min.

Several good performances by "Nelsons" were noted during Christmas week on the Bournemouth route. With a train of 470 gross tons, No. 861 "*Lord Anson*" covered the 28.7 miles from Bournemouth Central to Southampton in 35 min. 55 sec. start-to-stop, an economy of 2 min. on booked time. The outstanding feature of the run was the smart start out of Bournemouth, 66 m.p.h. being touched before Christchurch, after which speed fell gradually to 46 m.p.h. on the climb past Hinton Admiral, which culminates at 1 in 103. In the reverse direction No. 854 "*Howard of Effingham*" achieved a notably fast finish into Bournemouth, the 9.4 miles from passing New Milton to the stop taking only 9½ min., with a maximum of 74 m.p.h. before Christchurch and a minimum of 56 on the two-mile climb, partly at 1 in 99, up to Boscombe. On this run the 15.1 miles from Brockenhurst to Bournemouth Central were covered in 19½ min. start-to-stop, booked time being 22 min.

By way of contrast, the 12-car Portsmouth electric trains have also been doing some smart running recently. On two successive "up" journeys, Clapham Junction, 20.5 miles, was passed in under 20 min. from the Woking start, although on both occasions power was cut off as soon as speed reached the 70 m.p.h. mark, and for quite long spells the trains were "coasting."

D. S. BARRIE.

Fast Running from Waterloo to Exeter

For the first time in 36-years the Southern, formerly London and South Western route between London

and Exeter provides at present on the average a faster and more frequent express service than that of the G.W.R., which is slightly longer. This is partly accounted for by the fact that the principal morning express in each direction runs regularly in two portions.

When recently logged the first part, westbound, leaving Waterloo at 10.50 a.m., had only 10 corridors on, including one of the now rare restaurant cars. With this 345-ton train "*Lord Nelson*" class 4-6-0 No. 862 "*Lord Collingwood*" travelled at pre-war speeds, getting out to Byfleet, 21¼ miles, in 24½ min. and running at 63-67½ m.p.h. all the way from Surbiton until brakes were applied, which led to a stop outside Woking. Although halted for ¼ min. the arrival at the platform was only 10 sec. late.

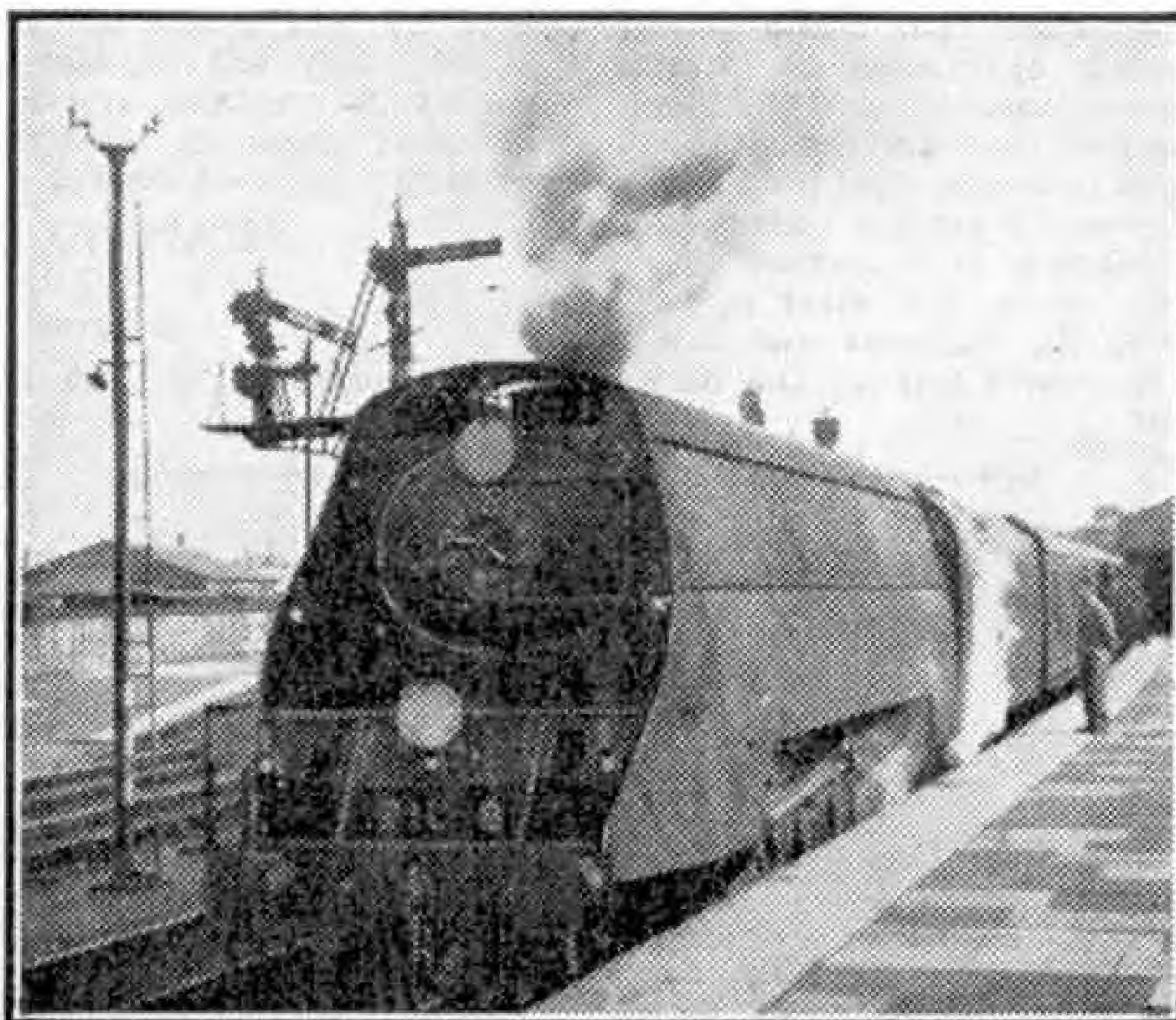
On leaving Woking, where nearly all the main line services now call in order to make outer suburban connections, speed worked up to over 50 m.p.h. on the 6¼-mile rise to mile post 31, and averaged 67.7, with a maximum of 75, thence to passing Basingstoke, where only 24½ min. had been taken from the Woking restart, 23½ miles away. Unfortunately signal delays then occurred at intervals from a special or milk van train ahead, but had similarly fast running been sustained, Salisbury would have been reached in 62-63 min. from Woking, well before time. Actually the arrival there was 10 min. late.

No. 21C 3 "*Royal Mail*," one of the "Pacifics" of the "Merchant Navy" class now took charge for a non-stop run over the steep gradients of Dorset and Devon to Sidmouth Junc., and gave a good performance though probably running under easy steam, regaining 5 min. and making the 75½-mile journey in 88 min., including two slight signal slowings and two service or p.w. checks. A fast run followed over the sharply graded 12¼ miles on to Exeter in 15½ min., so regaining another 1½ minutes.

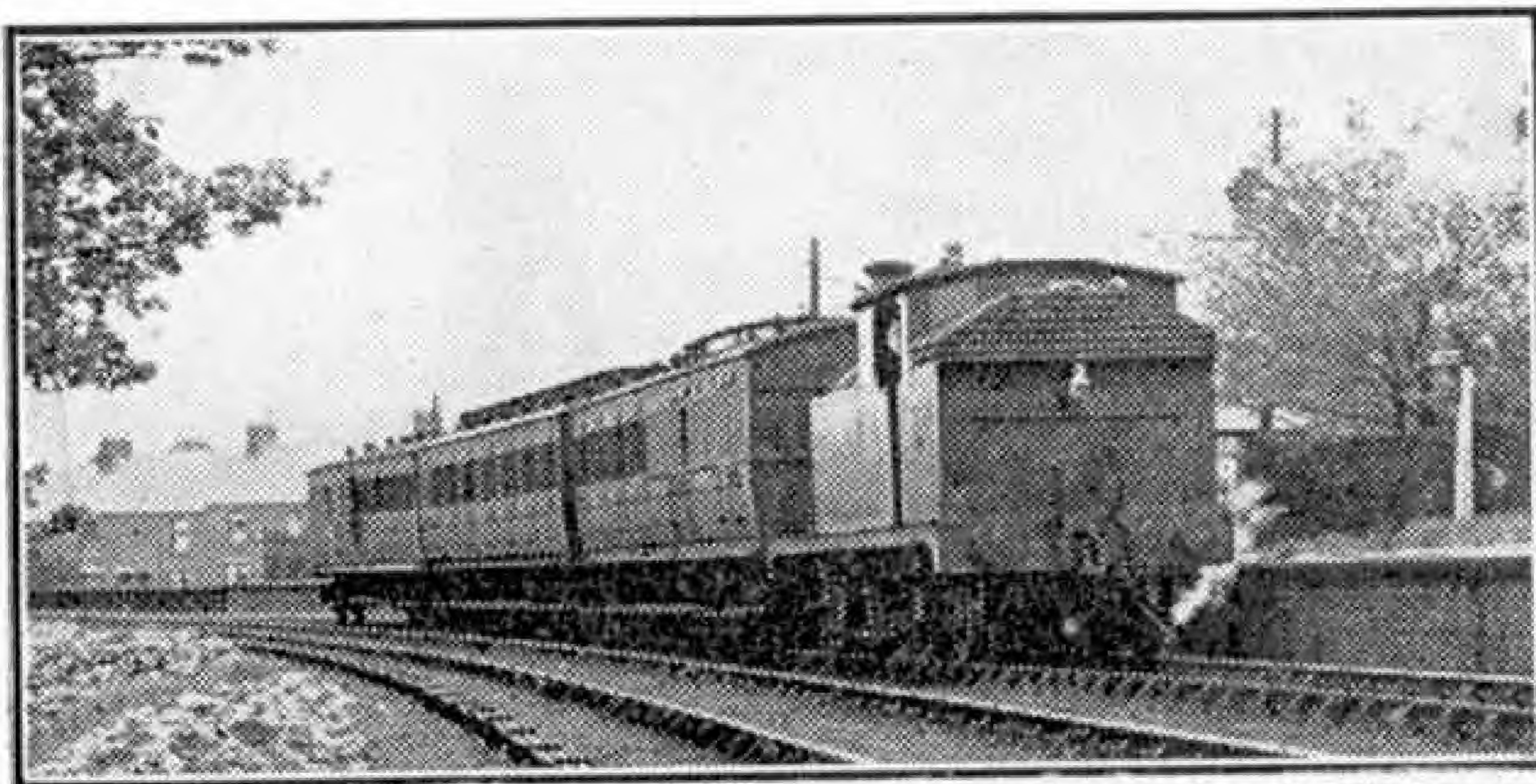
High Speed Tank Engine Running in Scotland

We have previously referred to the fast running still obtaining on the Ayr and Ardrossan to Glasgow routes of the former Glasgow and South Western Company, now incorporated in the L.M.S., and details are now to hand of a very speedy trip by No. 2661, a 2 cyl. 2-6-4T, hauling a considerable train of 9 bogies plus van, weighing about 295 tons full.

The start was from Stevenston on the Ardrossan line, and this express only just secured the road in front of an Ayr train at Kilwinning junction, where a distant signal at danger caused a loss of ½ min. On accelerating after passing the junction, the 14¼ miles between Dalry and Elderslie were covered at an average of 68 m.p.h., largely on the level; of this distance 7¼ miles, including the gentle descent past Milliken Park, were reeled off at more than 70 continuously. Elderslie, 19¼ miles, was passed in 21 min., and but for another signal delay the train would have been in Paisley 2¼ min. later.



Ready for the "Right Away." S.R. No. 21C 8, since named "Orient," on a down Plymouth express. This photograph by G.O.P. Pearce shows the chimney and smoke deflecting front end arrangements of the Bulleid "air-smoothed" 4-6-2s.



L.N.E.R. 0-4-4T No. 1772 at the head of a train on the Durham-Waterhouses branch. Photograph by H. C. Casserley.

The Waterhouses Branch Train

The upper illustration on this page shows the Durham-Waterhouses branch train reaching its terminus in a picturesque setting. It is hauled by one of the stout "G5" 0-4-4Ts, originally "0" class, with 5 ft. 1½ in. driving wheels, which were built by the former North Eastern Railway in large numbers over 40 years ago for suburban work in Yorkshire, Durham and Northumberland, often over difficult grades. They are still rendering useful service. Though once providing a frequent service, this six-mile branch now only boasts one regular passenger train per day in each direction.

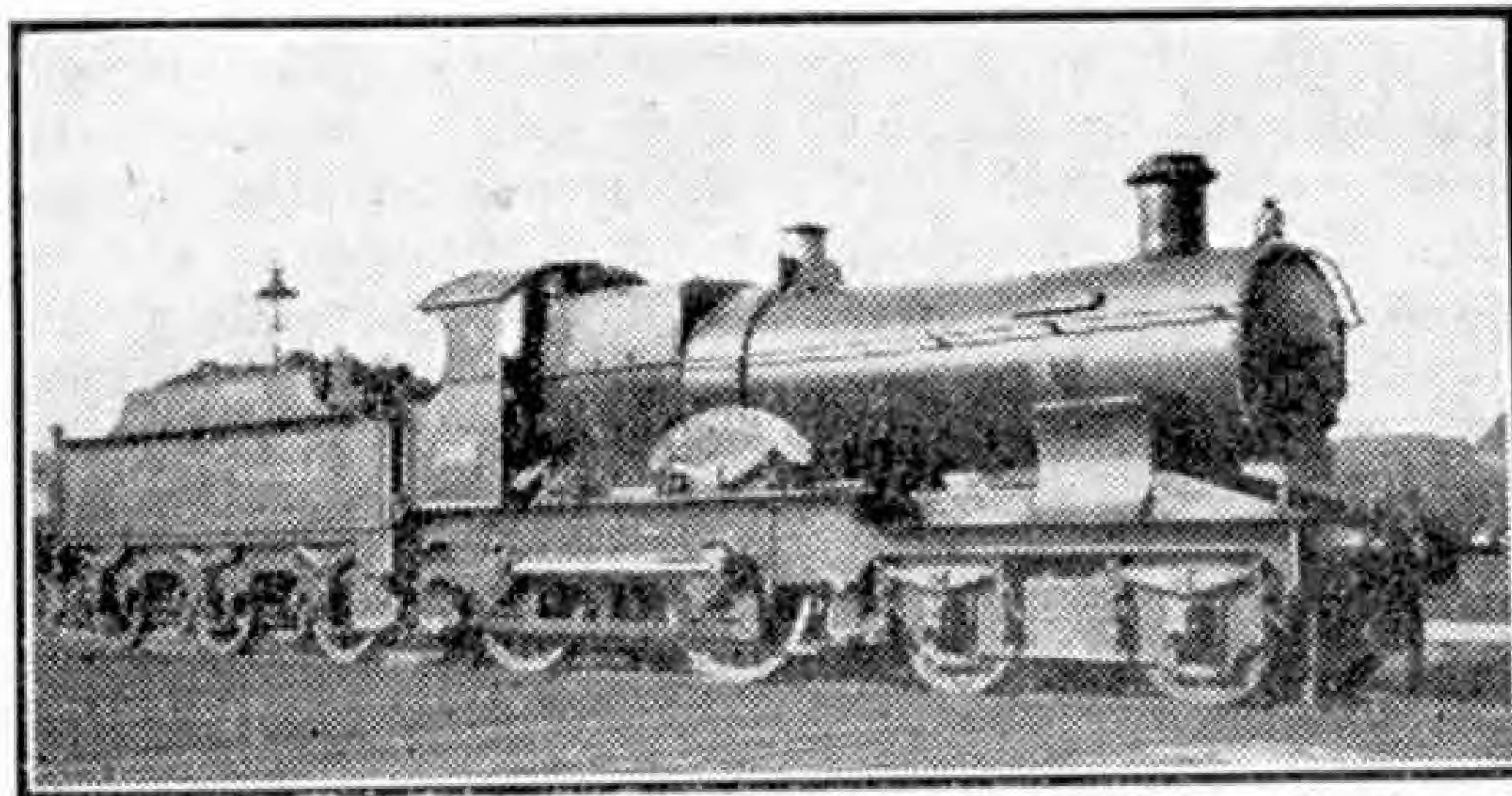
It will be noted that each of three coaches is of a different N.E. pattern; one has a clerestory roof, and the leading one has a guard's look-out window of the old style elevated type.

Non-Stop Royal Travel on the G.W.R.

Just 41 years ago, on 10th March 1902, when the late King Edward VII and Queen Alexandra went to lay the foundation stone of Dartmouth Naval College, their special took only 4 hrs. 23 min. to complete the 228½ miles non-stop from Paddington to Kingswear. After the ceremony the Royal party went on to Plymouth and returned on the following Monday, when the first non-stop run was made from Plymouth to Paddington in 4 hrs. 44 min. for 245½ miles; it must be remembered that the 20-mile longer Bristol route had then to be used. It was not until 1906 that the Westbury route was completed, and enabled considerable acceleration to be effected in West of England schedules.

The engine in each case was an "Atbara" class 4-4-0, of modest size, originally named "*Baden Powell*" but re-christened "*Britannia*" for the occasion. The "Atbaras" were built in 1901 to the designs of Mr. Wm. Dean. They were somewhat similar to the "Bulldogs" as built, though having larger 6 ft. 8 in. driving wheels and straight frames. They carried names identified with outstanding incidents with which celebrated soldiers of the Empire were associated.

Members of the Forces and their dependents made 10,795,179 main line journeys in a recent month.



G.W.R. "Bulldog" No. 3400 "Winnipeg." The "Atbaras" referred to on this page were somewhat similar, but had larger driving wheels for fast passenger work.

L.N.E.R. Locomotive Doings

New three-cylinder 2-8-0s of the Gresley "02" class numbered 3833-53 are in service. Of these all but Nos. 3845-6 at Peterborough, are allocated to Doncaster, whence they work in all directions. Those so far seen have standard tenders of "149" 4-4-0s, which have been provided with older G.C. pattern or other spare tenders. Nos. 3671-4, completing the latest "Green Arrow" 2-6-2 series, are at work in the N.E. area, where the new "B" class 4-6-0 No. 8301 "*Springbok*" was on trial just before Christmas, later coming to Liverpool St., and on to Ipswich line workings. Of the "Q1" 0-8-0T converted

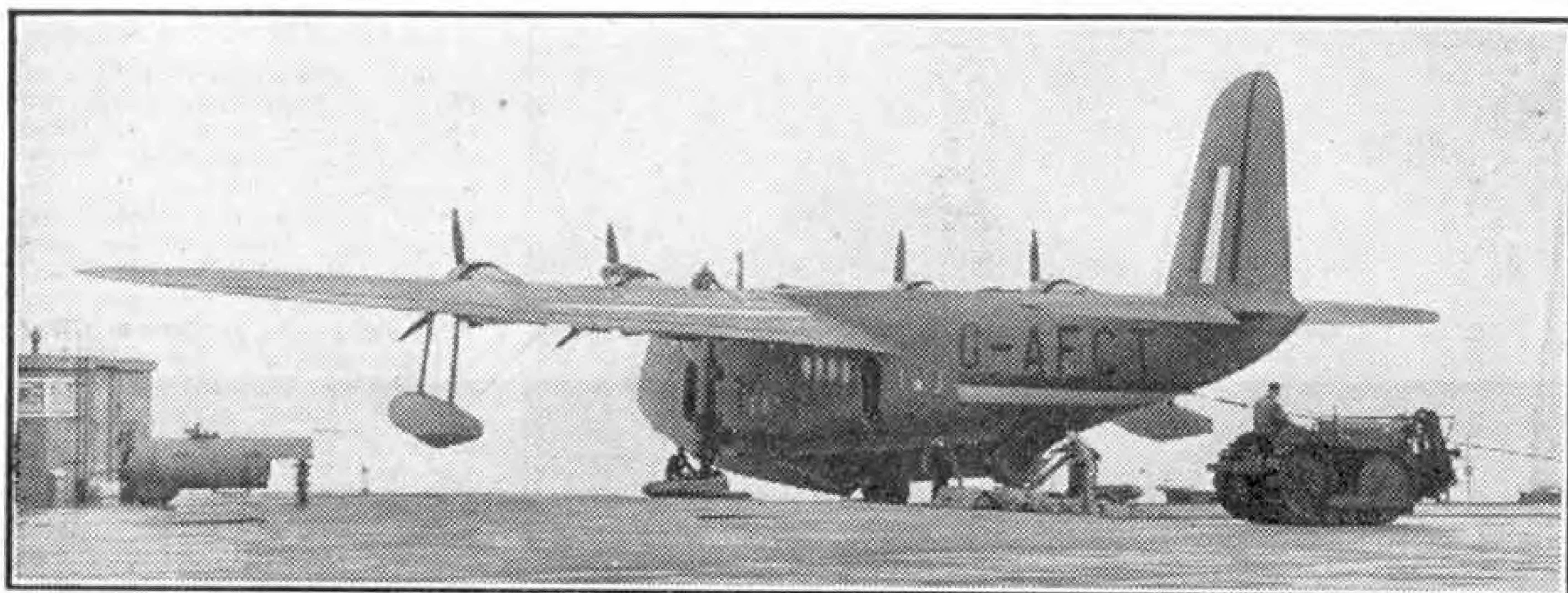
from former G.C. 0-8-0 outside cylinder mineral engines, No. 5058, the first, which we recently illustrated, has been working in Notts., and the second, No. 5961, at a famous marshalling yard in East Anglia; the third, No. 6139, was lately shunting near Doncaster.

Nearly all the "Pacifics" of classes "A1" and "A3," converted from "A1," that for the last few years have been running on the Great Central Section services have returned to G.N. sheds, but some "Green Arrows" and "Sandringhams" remain on the G.C., as well as the largest Gorton types. Although the continuous locomotive runs with one train between King's Cross and Edinburgh or Newcastle are not made at present, engines are still worked hard so that mileages quickly accumulate. For example, No. 4484 "*Falcon*" of the streamlined 4-6-2 class recently ran 1,468 train miles in about 96 hrs., making four trips from King's Cross to Grantham and back as well as two to Doncaster and back, in most cases with very heavy trains. Daily round-trip turns include a through run from Leeds to London, involving running 371½ train miles in from 15 to 18 hrs.

No. 4494 "*Osprey*," a streamliner, has been renamed "*Andrew K. McCosh*" after a veteran Director of the L.N.E.R. and previously of the North British Railway. Further rebuilds from "A1" to "A3" 4-6-2 include No. 2554 "*Woolwinder*," No. 2563 "*Tagalie*," No. 2582 "*Sir Hugo*," No. 4471 "*Sir Frederick Banbury*" and No. 4474 "*Victor Wild*."

The last named has had the unique experience of running non-stop from Paddington to Plymouth during the "Pacific"-*"Castle"* exchange trial of 1925, and also over the 268 miles from King's Cross to Newcastle in 1927 during the seasonal working that preceded the institution in the following summer of the non-stop "*Flying Scotsman*" between London and Edinburgh. In each case at the time these were world record regular non-stop distances. No. 4474 has now returned to her old shed, King's Cross, after a spell at Manchester, whence she had been working on the Marylebone express service.

No. 365, "*The Morpeth*," the "Hunt" 4-4-0 recently rebuilt with inside cylinders has, since transfer to Scotland, been noted on fast Edinburgh-Glasgow trains.



The "C" class Empire flying boat "Champion" ready for launching after routine overhaul. Photograph "The Aeroplane" Copyright.

Servicing British Airways Aircraft

The Work of a Flying Boat Base

THE operation of regular air services is practically unaffected by weather, but is dependent upon the aircraft employed being maintained in flying, or airworthy, condition. This essential airworthiness is the responsibility of the servicing department of the operating company.

Before the war maintenance work on the great aircraft fleet of British Overseas Airways Corporation was carried out at one or two main bases, but now the servicing bases are dispersed to many stations on the routes over which the aircraft fly. These routes extend from just south of the Arctic Circle to Durban, South Africa, and from the United States to Calcutta, India. A total of about 50,000 spare aircraft parts is distributed among the 101 bases, as the range of spare parts required is much greater than in normal times. At present there are about 20 different types of aircraft in the Corporation's service, whereas in pre-war days the fleet consisted of machines of a few well-chosen types, and this policy kept down the number of different spare parts that it was necessary to stock. Replacement when necessary of these "standard" type aircraft by similar machines has become so difficult, owing to aircraft firms being too busy on military orders, that the Corporation's fleet has been replenished with such British and American machines as were available, many of which were never designed for such work. This in turn has involved stocking a range of spare parts for every fresh type of machine added to the fleet.

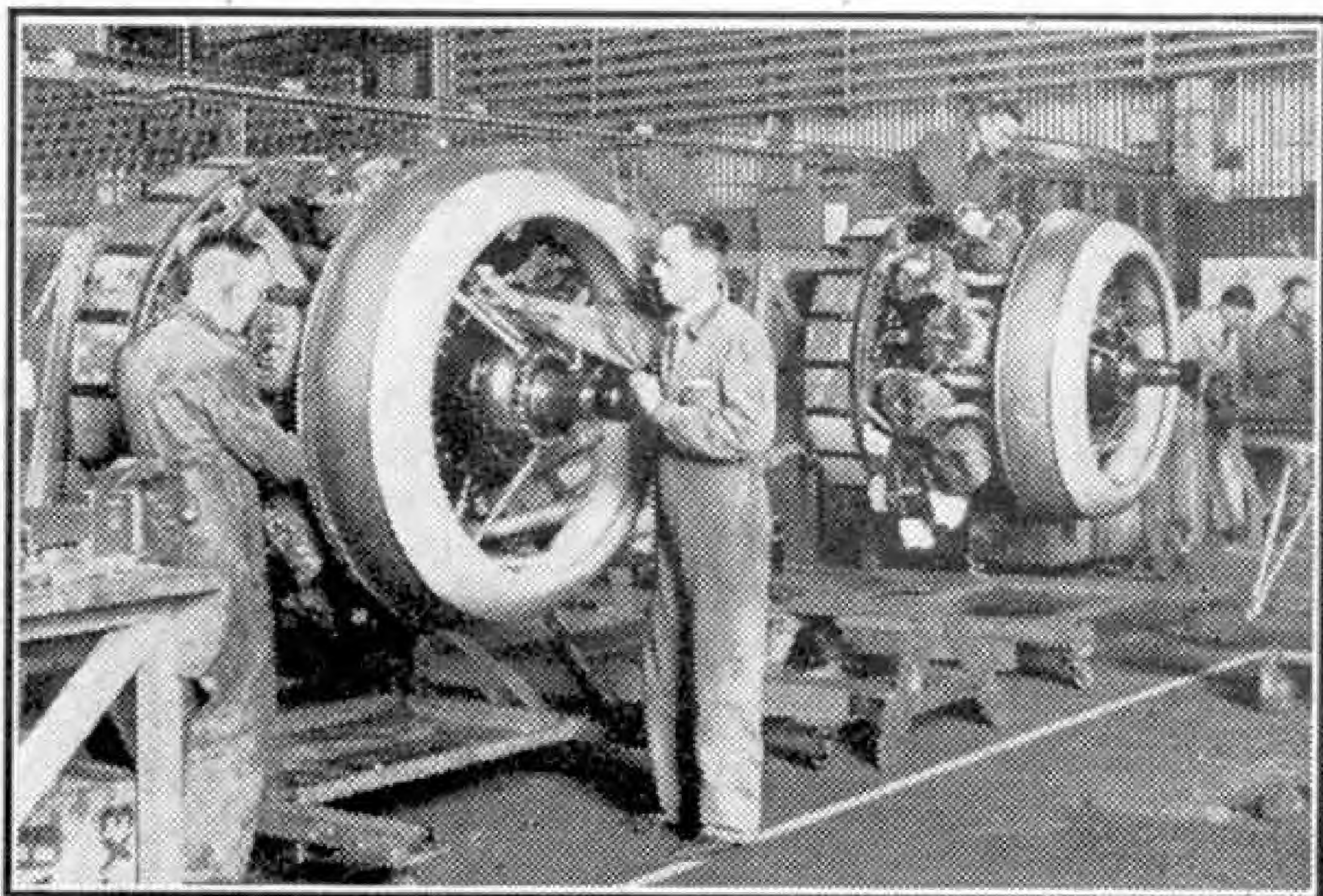
The illustrations to this article were taken at a British Airways marine base in this country, where the Corporation's flying boats are overhauled and prepared for further service. These 4-engined aircraft fly many thousands of miles along the essential lines of communication of the United Nations' war effort, and some of their journeys necessitate non-stop flights of over 1,900 miles.

When one of the flying boats returns to the marine base from a long flight, a responsible member of the company's department meets the captain at the head of the slipway as the crew come ashore. The captain hands over his report on the behaviour of the aircraft during the trip, and the technical log containing all information relevant to the mechanical condition of the aircraft, its engines, navigating and other equipment. This data includes routine sheets on which the performance of the aircraft and its engines were recorded from readings taken at regular intervals during the flight, also details of any maintenance jobs carried out at overseas stations during the trip. This mass of information provides the servicing staff at the marine base with a complete mechanical history of the aircraft from the day that it left them after its previous overhaul.

By 20 min. or so after arrival the flying boat has been beached, and usually towed into the huge hangar by tractor or winch. Tall platforms built of steel scaffolding and mounted on wheels are then run up to the aircraft, so that the inspectors who

went aboard it just before the beaching to begin a preliminary examination can complete their task. Soon a copy of their report and of the routine sheets already referred to are put up on a notice board for the information of the remainder of the servicing staff. These reports enable specialist supervisors to allocate to particular members of the staff any special work on the machine required by the inspectors.

Engines and engine installation details, airscrews, radio equipment, instruments, hydraulic apparatus, electrical accessories, and upholstery, which have been in use for their allotted period of service are removed and sent to the appropriate workshop at the base for overhaul. Some of these shops have ingenious testing equipment designed by the staff for the work done there. If the engines require a major overhaul they are sent to a central depot established by the company. After overhaul the engine units are built up again into a complete "egg," ready for reinstalling in the aircraft nacelle. Other detachable parts of the flying boat such as ailerons, elevators, rudders, fins, and fuel tanks, are dealt with in another part of the workshop, and in the airscrew overhaul shop the "props" from the aircraft are checked for balance, and minor overhauls



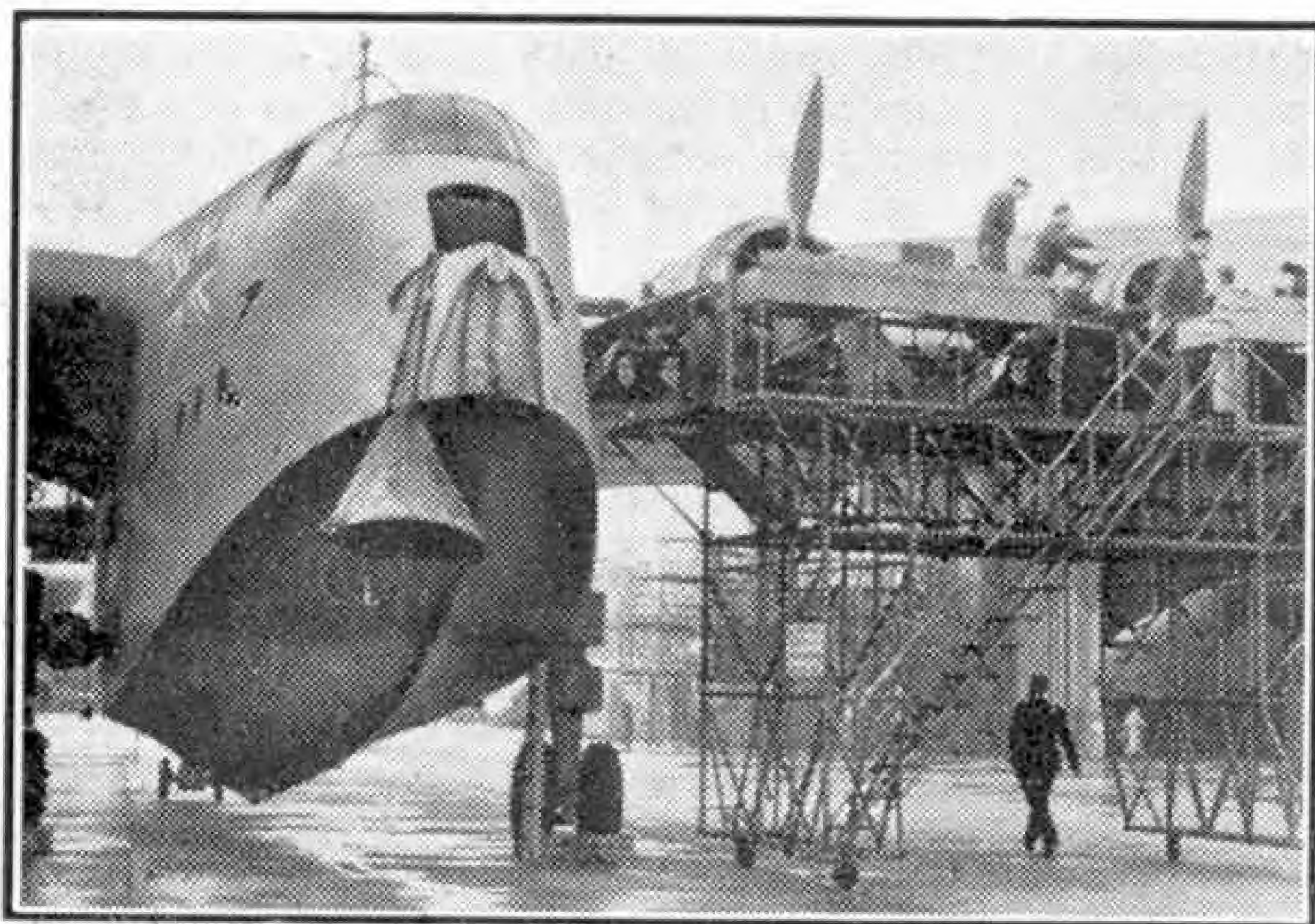
Two Bristol "Hercules" IV engines, for "G" class flying boats, in the later stages of overhaul. Photograph "The Aeroplane" Copyright.

effected. If major repair or adjustment is required the airscrews are sent to a central depot for the work. Other important sections are the machine and carpenters' shops. Finally there is the stores where thousands of spare parts are stocked. A proportion of new stocks received at this store are passed on to the overseas marine bases.

When all the work on the aircraft called for in the inspection reports and routine sheets has been done to the satisfaction of the specialist supervisors the inspection staff carry out a final examination to ensure that each item has been finished in accordance with the standards laid down. Then the aircraft is towed out of the hangar, and the engines, controls, instru-

ments, and auxiliary equipment are given a thorough ground test. After any necessary adjustments have been made, under the survey of the inspection staff, the flying boat is launched and a test flight made.

When all concerned are satisfied that the flying boat is again 100 per cent. fit for service, qualified ground engineers certify its airworthiness. Then the "Aircraft Prepared for Service" form is filled up. This form is used to inform the traffic and operations department of the tare weight of the aircraft, so that the required amounts of petrol and lubricating oil, and the payload, may be worked out.



A steel scaffolding platform being used to attend to the "Hercules" engines of a British Overseas Airways flying boat. The conical object hanging from the bow is a sea anchor. Photograph "The Aeroplane" Copyright.

Photography

In Streets and Towns

By A.R.P.S.

THE very mention of the name March suggests wind, and to the amateur photographer this suggests movement, one of the things that we try to avoid in our exposures. At the same time the effect of wind can be usefully employed to secure pictorial results in subjects such as trees and seascapes. Generally speaking, however, it is more convenient to do our photography at this time fairly close to home.

Whether we live in villages, busy towns, or cities, there will be found in the streets, both main streets and quiet byways, many little items capable of making pleasing and interesting pictures. Most of us have had the tantalising experience of walking along the street on a fine afternoon and seeing something occur that would have made a splendid picture. "How I wish I had my camera," we say to ourselves. It is a good idea therefore to take our camera with us ready for use on a quiet stroll through the streets. Readers will be surprised to find how many chances of securing excellent results occur in this way. They probably would be more surprised to see the number of entries of this type that are sent in for competitions and exhibitions, and it is to be noted also that such pictures are more likely to catch the eye of the judge than landscape work of the usual type.

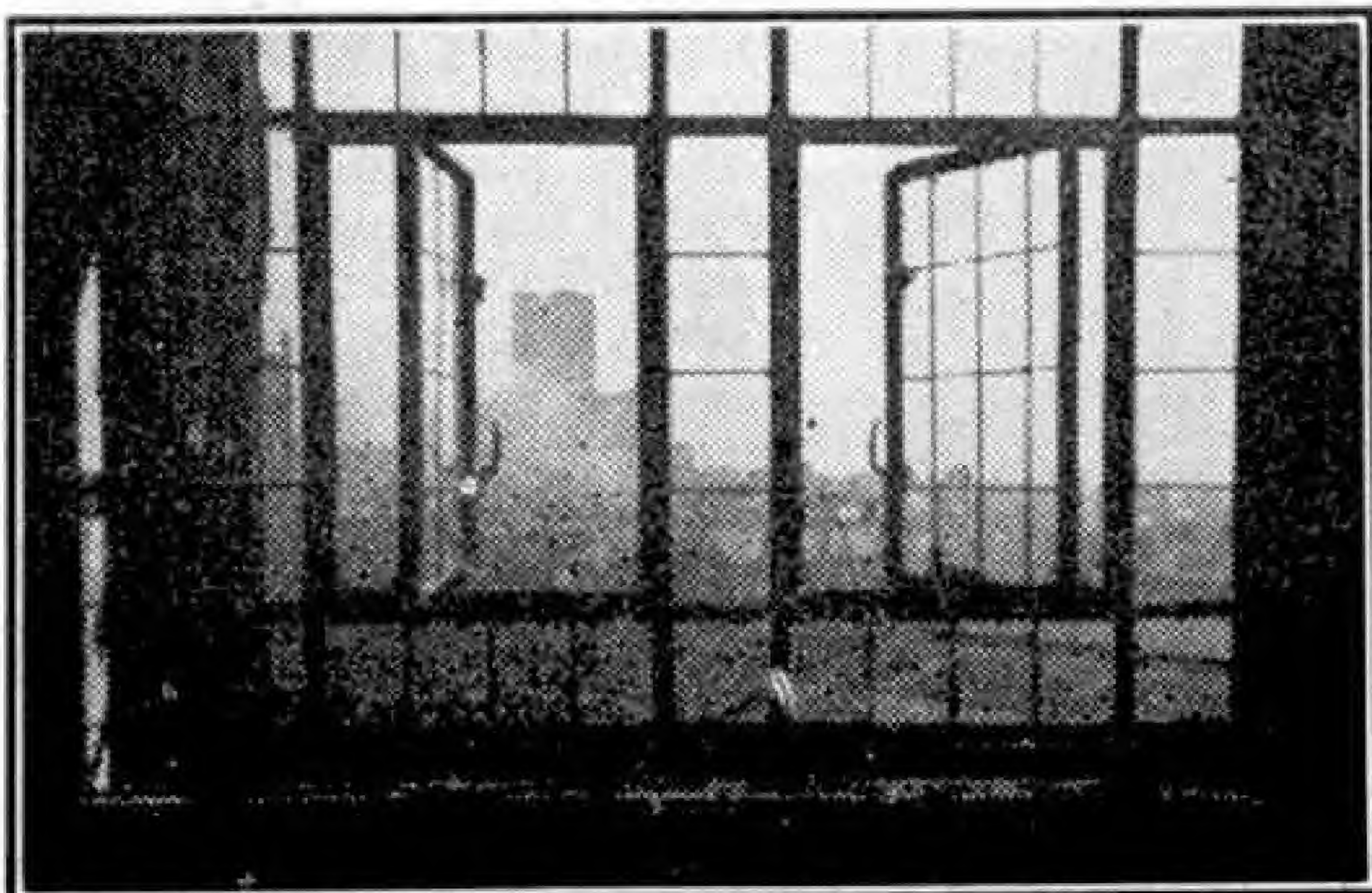
The majority of street scenes include people or objects in motion, and therefore fairly short exposures are necessary. Lighting is extremely changeable at this



Feeding the Pigeons, a street scene. Photograph by T. C. L. Hutchinson.

time of the year and is not easy to estimate. As a general rule you should keep in mind that there is a risk of under exposure. In our streets the lighting is mostly "top," and there is comparatively little from the surroundings of the object, especially if these are dark. Using a fast film such as "Selo H.P.3," an exposure of 1/250th sec. would be about right in sunshine between 10.30 and 3.30 with a stop of F.6.5. If your lens opens only to F.8 then you must use a shutter speed of about 1/100th and hope for the best as regards movement.

The main requirement for this type of photography is patience. You may walk about for hours before seeing anything of interest, but a good subject may crop up at any moment, so have your camera ready to be brought into action quickly. You have got to realise that for the time being you are doing similar work to that of a press photographer, who may go for weeks without getting a real "scoop." So be cheerful about the work, and eventually something will happen just when you arrive on the spot.



Over the rooftops. Photograph by J. E. Martin, Fishguard.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A "MECCANO" BRIDGE

The bascule bridge shown in the upper photograph on this page was built at West Bridgford, Nottingham, in 1929, thus forestalling the one at Dublin, described in the "M.M." for April 1942, said to be the only one in the British Isles. The bridge has always been known locally as "The Meccano Bridge," doubtless from the appearance of its girders.

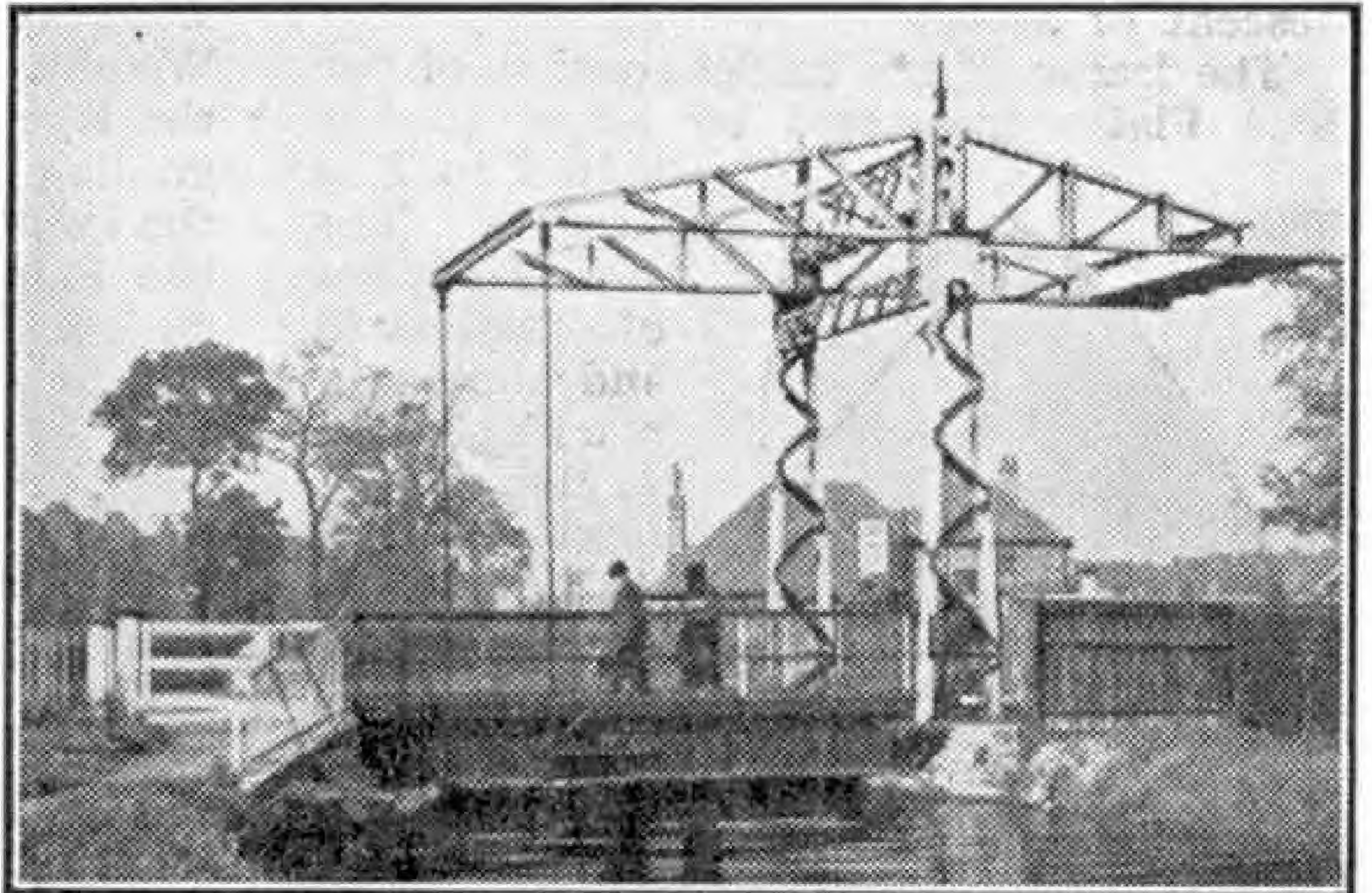
The bridge crosses the Nottingham-Grantham Canal and has a span of 16 ft. 6 in. and a clear height of 14 ft. 6 in. It takes a distributed load of 50 tons. As it is much used by pedestrians going into Nottingham on business, as well as by local traffic, it has a 3-ft. footpath on each side of its 11-ft. roadway.

As it only clears the water level by 9 in., the bridge was designed for easy hand operation, so that it could be opened by the boatman in charge of each barge passing up the canal. The barge normally carries a handle to open lock sluices. To open the bridge, the boatman slips this handle on to a winding square connected to a worm gear, by means of which he winds a drum round which is coiled a wire rope. The rope passes over a pulley at the top of one of the standards and is attached to the base of the bridge. As he winds, the bridge opens upwards, being counterbalanced by a box girder. This contains gravel, and its weight can be adjusted by filling it with water.

Another interesting point of construction concerns the flooring of the roadway. This is of timber, laid on steel joists, and is of two thicknesses. No two wheels of a vehicle can stand on the same plank at once.

Since the bridge was built, the canal has lapsed into disuse, and three years have passed since it was last opened for water traffic. But it is opened regularly

for repainting the underside every two years. This is done at four o'clock on a Sunday morning, a day that is chosen so that traffic is interfered with as little as possible. The early start is made so that the job is finished in time for people to cross the bridge on their way to church.



An interesting type of lift bridge at West Bridgford, Nottingham. Photograph by E. Richardson, West Bridgford.

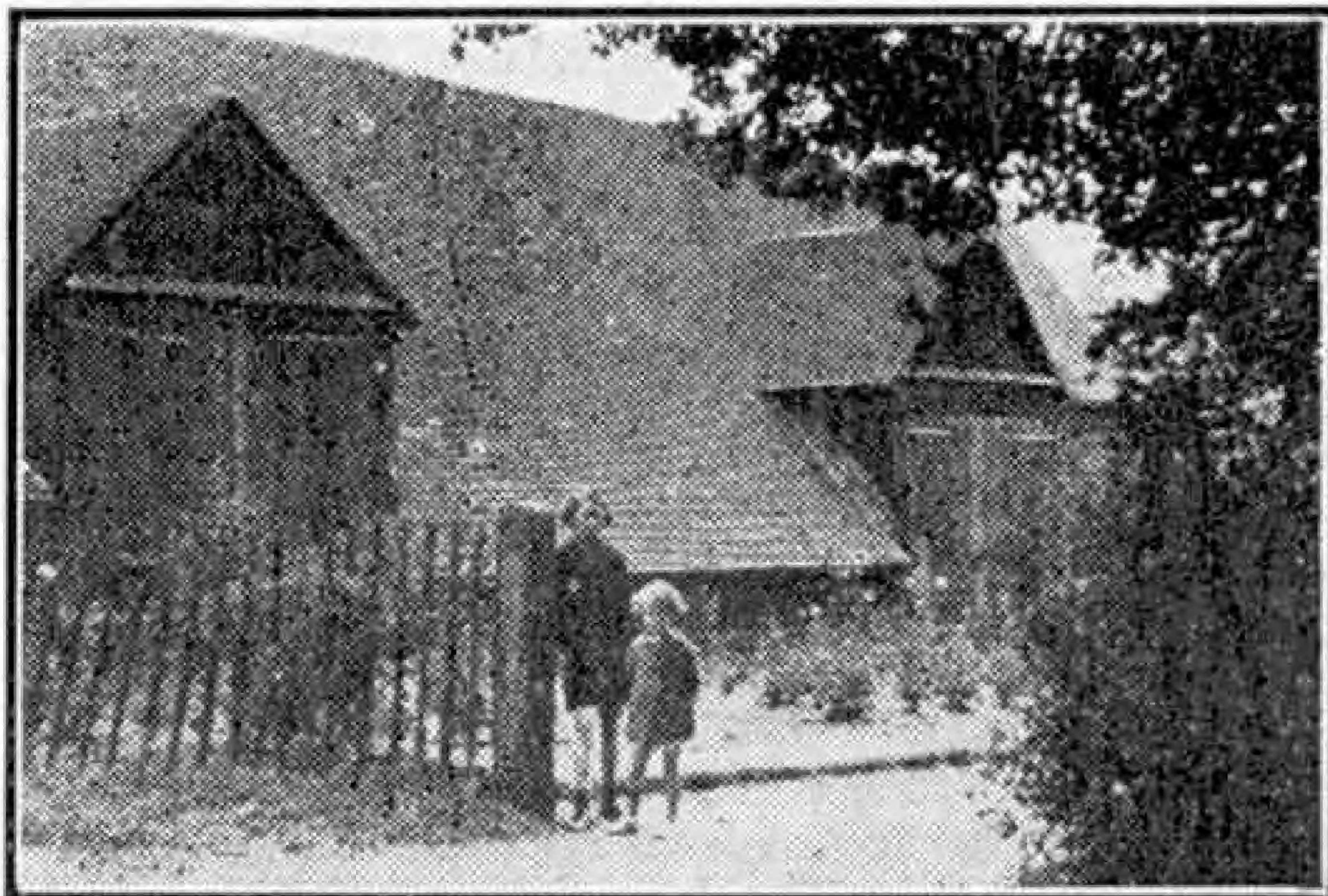
E. RICHARDSON (West Bridgford).

BARN BUILT FROM SHIP'S TIMBERS

Close to Chalfont St. Giles, in leafy Buckinghamshire, is the Quaker village of Jordans, with its famous Meeting House, where William Penn, the founder of Pennsylvania, is buried, and the Mayflower Barn at Jordans Farm, which is believed to have been built from the timbers of the "Mayflower," in which the famous Pilgrim Fathers sailed to the New World. Although doubts have been expressed from time to time as to the authenticity of the claim, it has now been proved up to the hilt that the barn was actually constructed from the remains of the "Mayflower," after she was broken up in 1625. This was five years after her great voyage, in which she carried about 100 men, women and children who actually landed at Plymouth, in Massachusetts, on 21st December 1620.

On one of the beams the letters "-R HAR-I" have been discovered. Experts are now agreed that the particular piece of timber originally came from the stern of a vessel, and that the letters are part of the words, "Mayflower-Harwich," at which port the famous ship was registered. In support of this theory it is pointed out that a man named Gardiner, who farmed Jordans in 1625, was also part owner of the "Mayflower," and that a close relative of his valued the historic vessel when she was handed over to the ship-breakers. Even the ordinary visitor cannot fail to notice that the barn's roof-trees, black with age, hard as steel, and impregnated with salt, bear every resemblance to the oaken ribs of a ship of the Stuart period.

CYRIL R. ROWSON (Liverpool 11).



Timbers from the "Mayflower," the historic ship in which the pioneers of New England crossed the Atlantic, were used in the construction of this barn. Photograph by C. R. Rowson, Liverpool.

Suggestions Section

By "Spanner"

(588) Mine Cage Depth Indicator ("Spanner")

The indicator shown in Fig. 588 will add interest to any Meccano model pit-head gears, and is quite easy to assemble. It is intended to show the depth of the cage from ground level at any point in its descent or ascent.

The frame of the model consists of two Flat Plates connected by Angle Girders bolted to Flat Girders. The dial is a piece of cardboard and should be marked in divisions to represent feet or inches

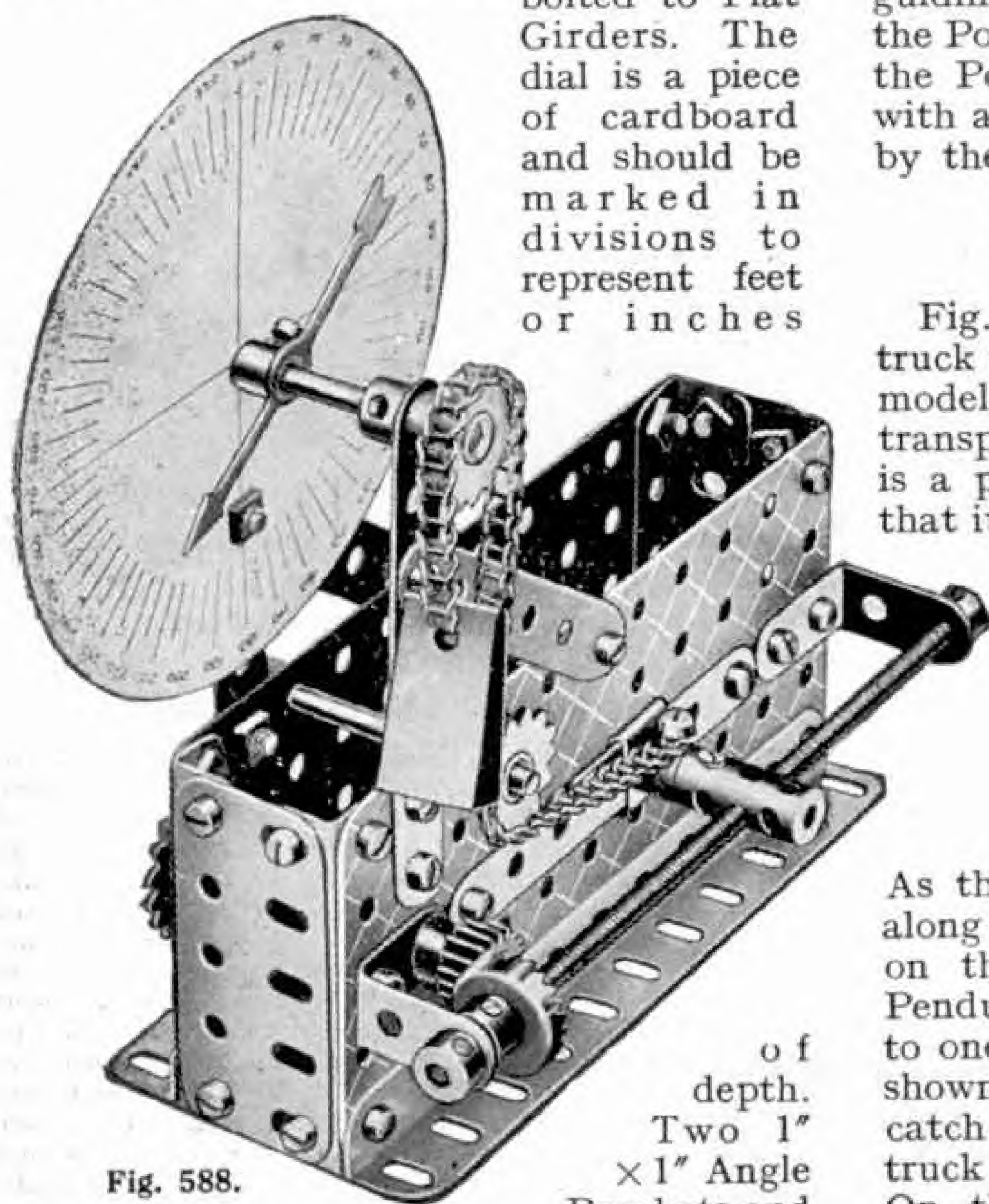


Fig. 588.

a $3\frac{1}{2}$ " Strip are secured to one of the side Plates, a washer on each of the bolts serving to space the parts from the Plate. Before the Strip is fixed in position, however, an Eye Piece is placed on it as shown. A 1" Rod is fixed in the boss of the Eye Piece and a Coupling is fitted on the projecting end of the Rod and a 6" Screwed Rod is passed through the centre tapped bore. The Screwed Rod, which is journalled in the $1" \times 1"$ Angle Brackets, carries a $\frac{3}{4}$ " Contrate Wheel, with which a $\frac{1}{2}$ " Pinion mounted on a Rod journalled in the Flat Plates meshes.

A 1" Sprocket Wheel on the other end

of the Rod is connected by Sprocket Chain to a second Sprocket driven from the winding drum, so that it is rotated in accordance with the movement of the latter. A length of Chain is fixed to the Eye Piece, and is then led over a guide Sprocket and the Sprocket on the pointer shaft before being attached to a 25-gramme Weight. As the driven Sprocket turns the Eye Piece mounting travels along its guiding Strip, and in turn the shaft of the Pointer is rotated. The disc over which the Pointer moves can easily be marked with a scale to show the position occupied by the cage.

(589) Self-Discharging Truck (A. Williams, Derby)

Fig. 589 shows a novel self-discharging truck that can be used in conjunction with models such as Ship Coalers and ore transporters. The bottom of the truck is a plate that is hinged at one end, so that it is free to fall downward. The plate is held in place by a simple catch 1, formed from a Bolt inserted together with a $\frac{3}{8}$ " Bolt, on which is fitted a Cord Anchoring Spring, in a Collar pivoted to a $\frac{1}{2}" \times \frac{1}{2}"$ Angle Bracket at the front of the truck.

The catch operates as follows. As the truck nears the end of its travel along the rails, the Cord Anchoring Spring on the $\frac{3}{8}$ " Bolt makes contact with a Pendulum Connection 2, which is fixed to one of the rails, and bent to the shape shown in the illustration. This turns the catch aside, so that the bottom of the truck falls and the contents are discharged. On the return journey of the truck a Pendulum Connection 3, which is curved slightly and fitted to the bottom of the truck, makes contact with a $3\frac{1}{2}$ " Strip 4 bolted across the rails, and pushes the bottom plate back into position. During this process the catch, which is still in the "open" position, makes contact with one of the Threaded Pins 5 fixed to the rails by Threaded Bosses, and this returns the catch to the "closed" position.

The method of discharging the truck is unique in the fact that, when the truck is required to carry heavy loads, little effort is required to slip the catch even with such a weight resting on it.

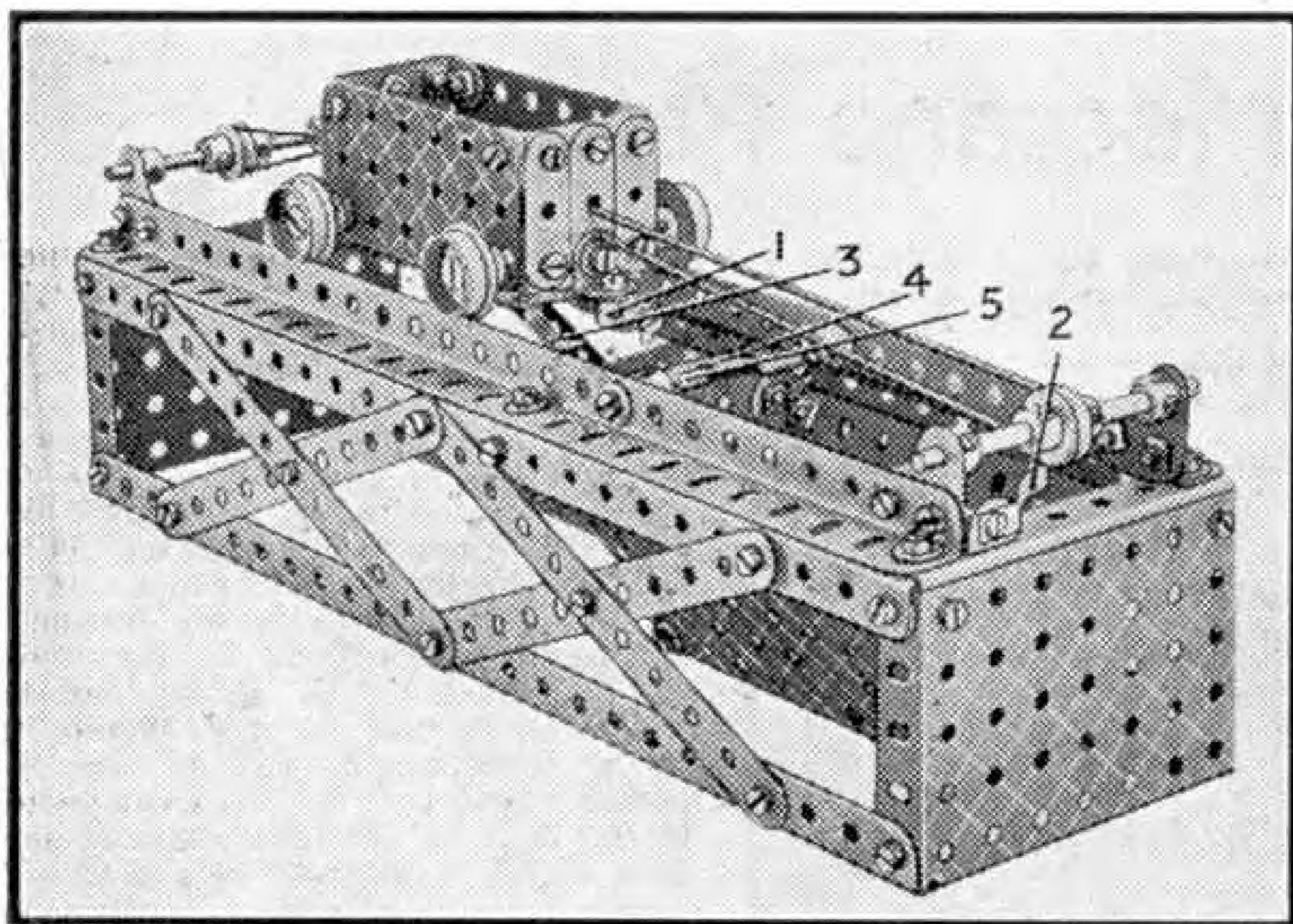


Fig. 589.

(590) Continuous Action Relay
(D. Brown, Uttoxeter)

The unusual type of relay shown in Fig. 590 is specially suitable for use in connection with burglar alarm systems, and is designed so that an alarm bell connected to it rings continuously when the alarm switch is closed. It continues to ring even when the alarm switch is re-opened, which may well occur when a burglar closes behind him the window or door through which he gained access to the premises.

The device consists of an ordinary type relay fitted with an additional pair of contacts. An Elektron Magnet Coil is fixed by means of several $1\frac{1}{2}$ " Strips to a $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, to which are bolted two $3\frac{1}{2}$ " Angle Girders. A Magnet Core is placed inside the Coil, and when current from a battery is passed through the core attracts a vibrating armature consisting of a Pendulum Connection 1 fitted at one end with four Flat Brackets, which are bolted to it together with two further Pendulum Connections 2 and 4. Pendulum Connection 1 is gripped by two Bolts in a Strip Coupling secured to the base plate, a Collar being used for spacing purposes.

One of the Pendulum Connections, 2, makes contact with a $\frac{1}{2}$ " 6 B.A. Bolt 3, which is adjustable by means of two 6 B.A. Nuts in a $\frac{1}{2}$ " \times $\frac{1}{2}$ " Angle Bracket fixed to the base, but insulated from it. The other Pendulum Connection 4 is

bent round and makes contact with a further 6 B.A. Bolt 5 that also is adjustable in a second $\frac{1}{2}$ " \times $\frac{1}{2}$ " Angle Bracket insulated from the base.

The relay is wired as follows. One lead from the Magnet Coil is taken to an insulated $\frac{1}{2}$ " 6 B.A. Bolt fitted with a Terminal 6, to which is attached one lead from the battery. The second lead from the Coil is attached to another insulated $\frac{1}{2}$ " 6 B.A. Bolt 7 fitted with a Terminal, and from this Bolt also a lead 8 is taken to the alarm switch. The other wire from the switch is earthed to the base, together with a lead 9 from the master switch. The second lead from the master switch is taken to an insulated $\frac{1}{2}$ " 6 B.A. Bolt and Terminal 10. A further wire is taken from the Terminal 6 to the alarm bell, the return lead from which is made fast to the contact screw 3, and a wire from contact screw 5 is attached to the Bolt 7.

together with a lead 9 from the master switch. The second lead from the master switch is taken to an insulated $\frac{1}{2}$ " 6 B.A. Bolt and Terminal 10. A further wire is taken from the Terminal 6 to the alarm bell, the return lead from which is made fast to the contact screw 3, and a wire from contact screw 5 is attached to the Bolt 7.

(591) Silent Free Wheel
(G. Owen, Wrexham)

A reliable free wheel that will be found useful in many types of models where a compact free wheel is required can be built from only four parts. It is of the coil type, which will take a remarkably great strain but can only be used to good effect when operated by hand.

The coil forming the free wheel in this mechanism is admirably represented by the Meccano Cord Anchoring Spring, Part No. 176. This is mounted on the Rod where it is required, and the looped end is fixed to the bearing, or in some cases to a rotating part by a $\frac{3}{4}$ " Disc.

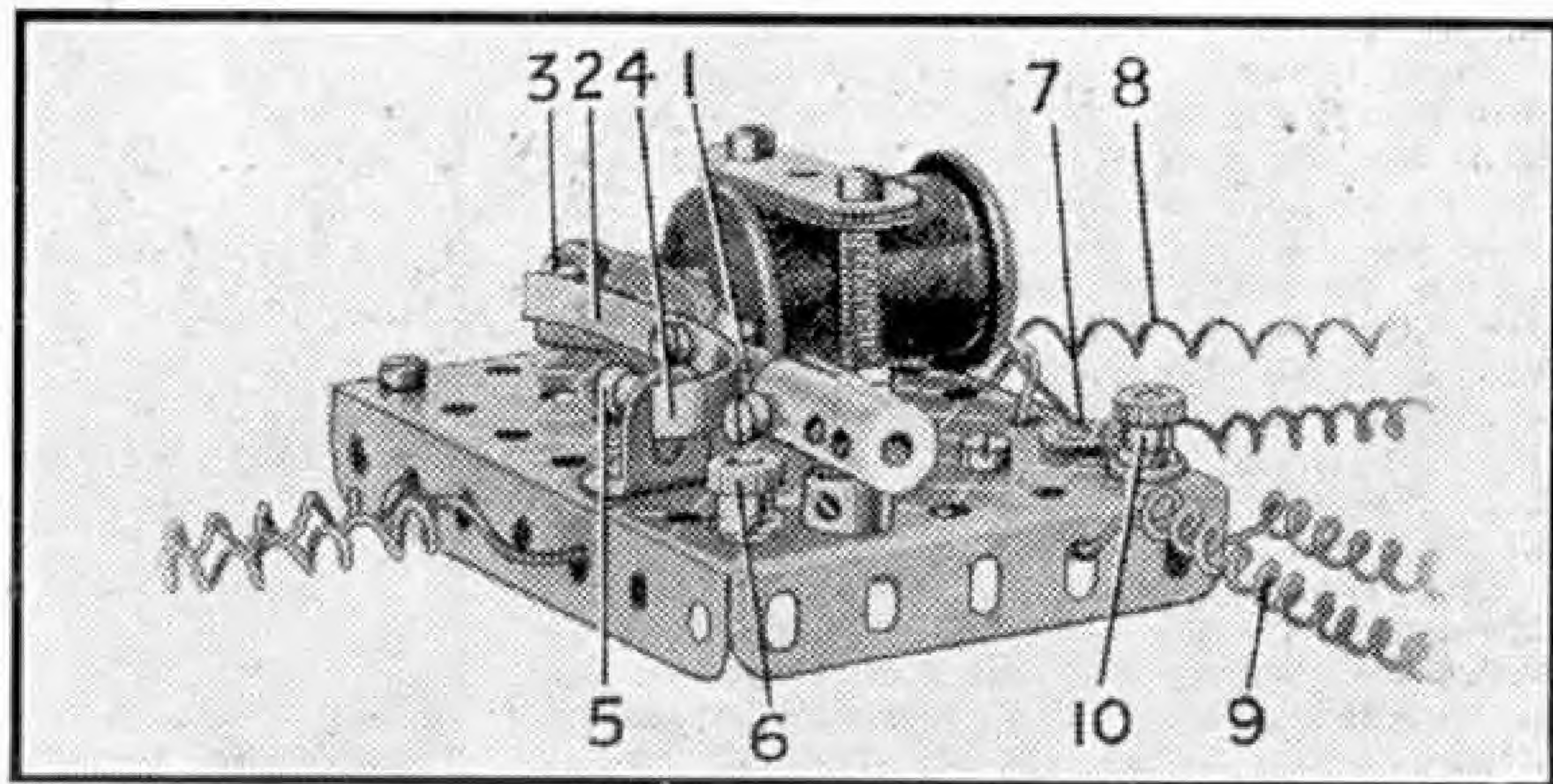


Fig. 590.

New Meccano Models

ONE of two new models we are describing this month is a streamlined locomotive, which is shown in Fig. 1.

In building the model two $9\frac{1}{2}$ " Angle Girders are spaced apart at their forward ends by a $4\frac{1}{2}$ " Angle

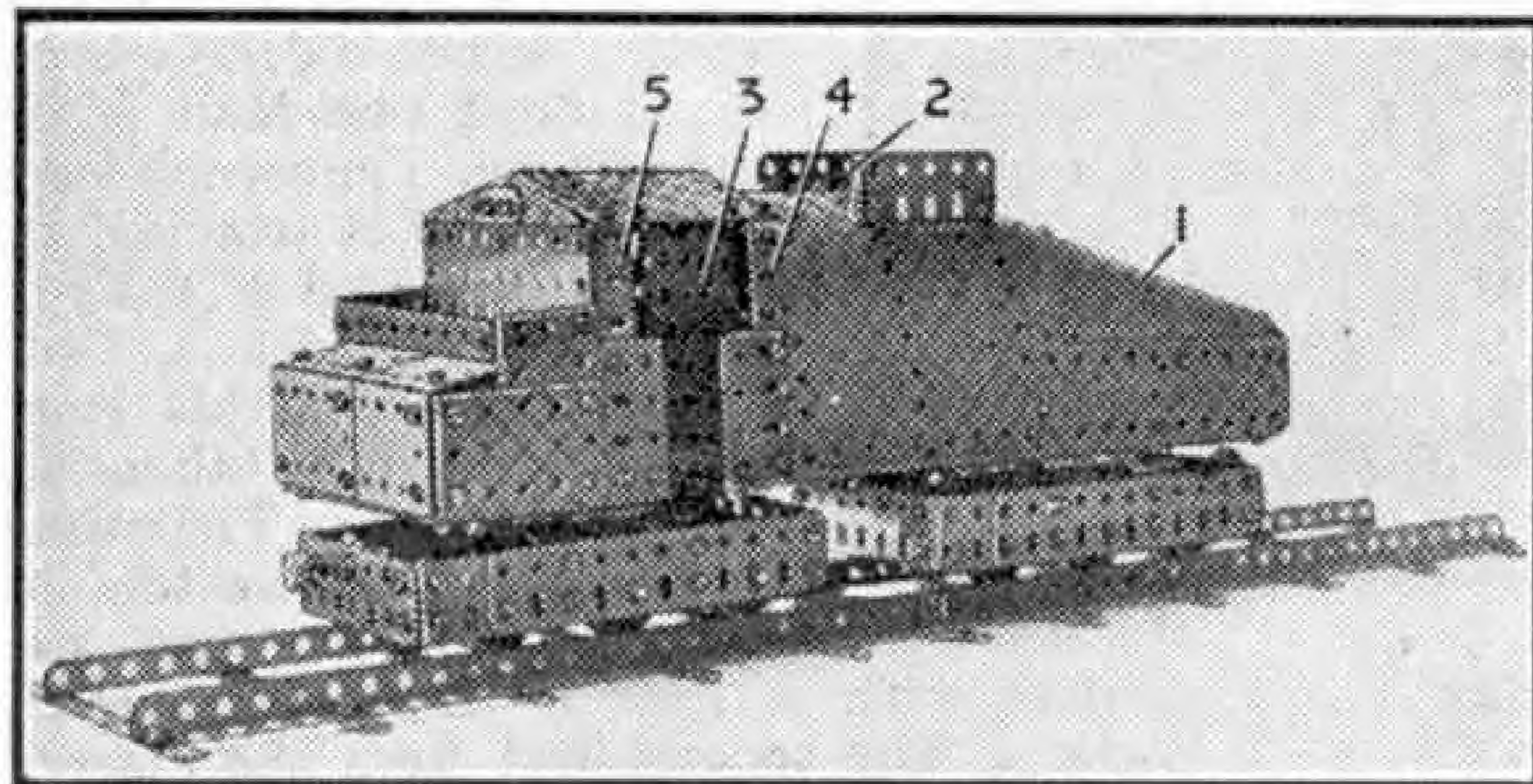


Fig. 1. A streamliner in Meccano. Good use is made of Flexible Plates in the construction of this fine model.

Girder, to which are bolted two $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates overlapped. At their other ends the $9\frac{1}{2}$ " Girders are extended by two $3\frac{1}{2}$ " Strips, which are attached to $3\frac{1}{2}$ " Angle Girders that support the water tank and coal bunker. The other ends of the $3\frac{1}{2}$ " Girders are bolted to a $4\frac{1}{2}$ " Angle Girder. The space between the side-members is filled by $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates and $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flat Plates.

How the bogies are constructed is shown by our illustration, and each is attached to a Face Plate by $2\frac{1}{2}$ " Strips. A $1\frac{1}{2}$ " Rod fixed in the boss of the Face Plate is free to pivot in Double Arm Cranks bolted to the Plates of the chassis.

To form the boiler and fire-box three $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates 1 are fixed by $\frac{1}{2}$ " \times $\frac{1}{2}$ " Obtuse Angle Brackets to the $4\frac{1}{2}$ " \times $1\frac{1}{2}$ " compound flexible plate already mentioned, those at the sides being attached to other Flexible Plates as shown. The smoke deflectors are then fitted, together with a Chimney Adaptor 2.

A $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate 3 is fixed to the chassis by a $4\frac{1}{2}$ " Angle Girder and is attached to the boiler by an Angle Bracket. Two $2\frac{1}{2}$ " Curved Strips are bolted to the upper end of the Flanged Plate by a $1\frac{1}{2}$ " Triangular Plate. Two $3\frac{1}{2}$ " Angle Girders 4 and 5 are attached to the chassis by $4\frac{1}{2}$ " Angle Girders, and to these are fixed the back and the roof of the cab as shown.

The construction of the water tank and coal bunker are clear from the illustration.

Parts required to build model Locomotive: 4 of No. 2; 1 of No. 2a; 2 of No. 3; 8 of No. 5; 2 of No. 8a; 4 of No. 9a; 6 of No. 9b; 4 of No. 9f; 2 of No. 10; 34 of No. 12; 8 of No. 12a; 9 of No. 12c; 6 of No. 15a; 4 of No. 18a; 12 of No. 20; 2 of No. 23a; 172 of No. 37; 1 of No. 53; 4 of No. 53a; 16 of No. 59; 4 of No. 62b; 2 of No. 77; 4 of No. 90; 4 of No. 103; 4 of No. 103d; 10 of No. 103f; 2 of No. 109; 2 of No. 120b; 1 of No. 164; 10 of No. 188; 2 of No. 189; 4 of No. 190; 4 of No. 191; 7 of No. 192.

Our second model is a fine three-wheeler fire-engine of the type that is particularly suited for dealing with small outbreaks of fire in confined areas, as the three-wheeler chassis allows them to be readily manœuvred in awkward places.

Construction of the model should commence

with the engine bonnet of the forward end of the chassis. Four $5\frac{1}{2}$ " Strips are bolted to a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, and those at the front end are attached to a further $5\frac{1}{2}$ " Strip forming the bumper. A $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " and a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate form the bonnet. A

$2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate is bolted to the front of the Flanged Plate 1 and is attached to the top of the bonnet by a $\frac{1}{2}$ " \times $\frac{1}{2}$ " Angle Bracket. This Plate and one of the Double Angle Strips of the radiator provide the bearings for the steering column 2. The front wheel is built in as shown and is connected to the steering column 2 by a short length of Cord that is passed round two $1\frac{1}{2}$ " Rods, mounted in the $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate at the back of the bonnet and also in $\frac{1}{2}$ " \times $\frac{1}{2}$ " Angle Brackets attached to each side. The ends are fastened centrally to the steering column by a Cord Anchoring Spring so that one end winds on it as the other unwinds on operation of the steering wheel 3, a Bush Wheel.

At the rear end of the chassis a $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate is bolted at each side of the Plate 1 and a bent

$4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate forms the front and top of the tank. The back of the tank also is a $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate, and it is fitted with a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate 4 bolted between the Strips at each side of the chassis to form the pumping unit. A $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate is also fitted to the Plate 4, together with a $\frac{1}{2}$ " Pulley representing a clock dial and two $\frac{1}{2}$ " Bolts forming the pump connections.

The ladder and its supports are assembled on the model together with other details such as the reel for carrying the hose, and the seats for the cab.

Parts required to build model Fire Engine: 2 of No. 1; 7 of No. 2; 2 of No. 3; 8 of No. 5; 4 of No. 10; 2 of No. 11; 8 of No. 12; 4 of No. 12c; 1 of No. 16; 2 of No. 17; 2 of No. 18a; 1 of No. 18b; 3 of No. 22; 1 of No. 23; 1 of No. 24; 7 of No. 35; 78 of No. 37a; 73 of No. 37b; 8 of No. 38; 1 of No. 40; 1 of No. 44; 1 of No. 48; 6 of No. 48a; 1 of No. 51; 1 of No. 52; 3 of No. 90a; 3 of No. 111c; 1 of No. 125; 2 of No. 126; 1 of No. 126a; 2 of No. 155a; 1 of No. 176; 3 of No. 187; 2 of No. 188; 1 of No. 189; 4 of No. 190; 1 of No. 191; 1 of No. 192; 2 of No. 199; 1 of No. 200; 2 of No. 214; 4 of No. 215; 2 of No. 217a; 1 Magic Motor.

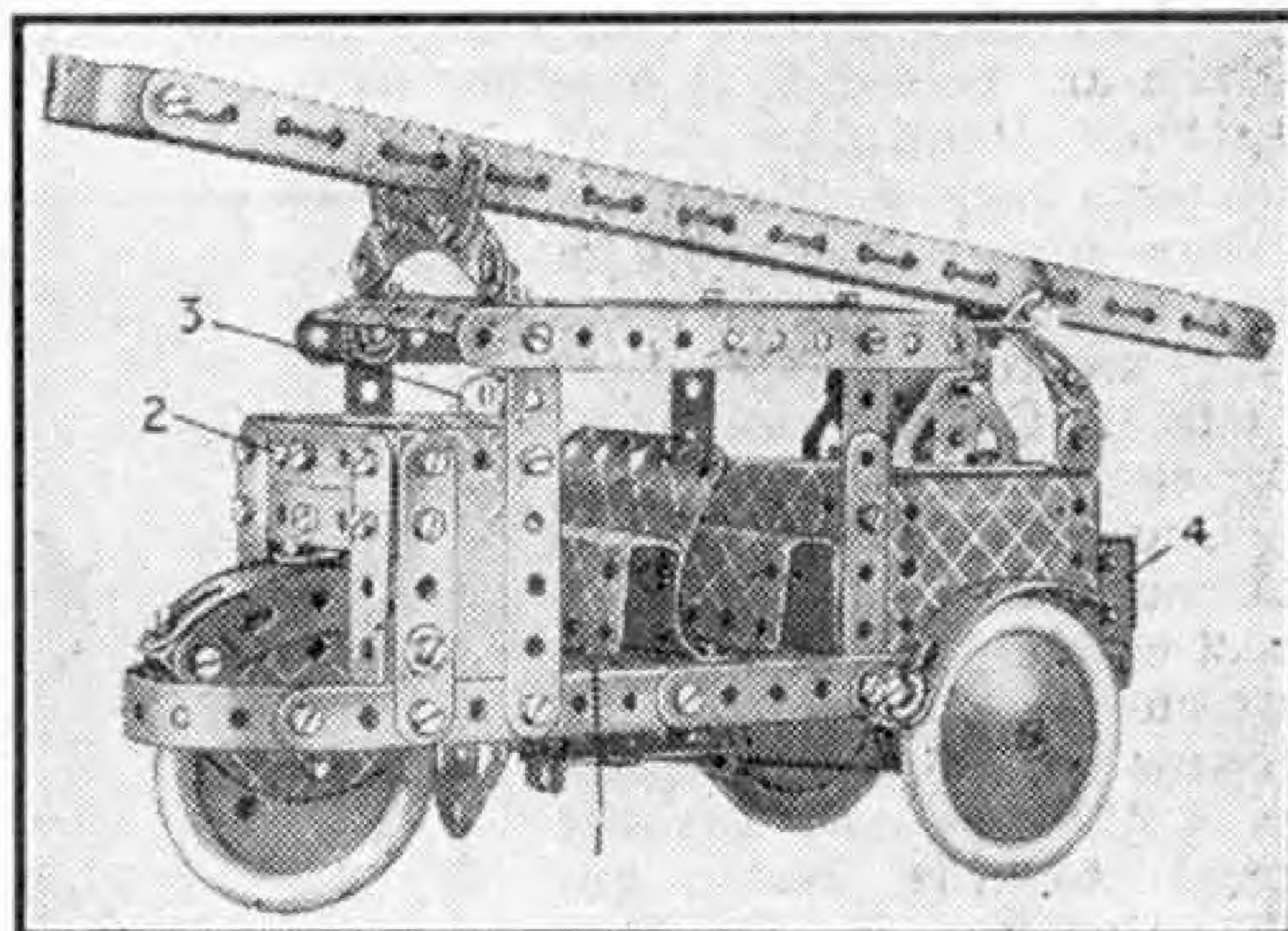


Fig. 2. A fine model of a three-wheeler fire engine, fitted with foam generating equipment. It is built with No. 4 Outfit.

Meccano Model-Building Competitions

By "Spanner"

Fine Prizes for Good Models

Model-builders can still build entries for the great "New Year" Contest announced in our January issue. Models of any size or type are eligible, and there will be equal chances for all, since there is a special section for competitors under 14, and ingenuity and realism in construction rather than mere size will be looked for by the judges.

In entering this contest all that is necessary after a suitable model has been built is to have it photographed, or to make a good drawing of it, and to add brief notes on points that require special explanation. Competitors should then put their names, ages and addresses on the sheets comprising their entries, and forward them to

"New Year Model - Building Contest, Meccano Magazine, Binns Road, Liverpool 13," to arrive not later than 31st March. Entries from competitors over 14 years of age should be marked Section A, and entries from younger competitors should have the words Section B on them.

In each Section the First Prize will be a cheque for £2/2/- and the Second and Third Prizes will be £1/1/- and 10/6 respectively. Other good entries will be awarded Consolation Prizes of 5/- each. Send in your entries now.

Prize-winning Models in the "New Year" Contest

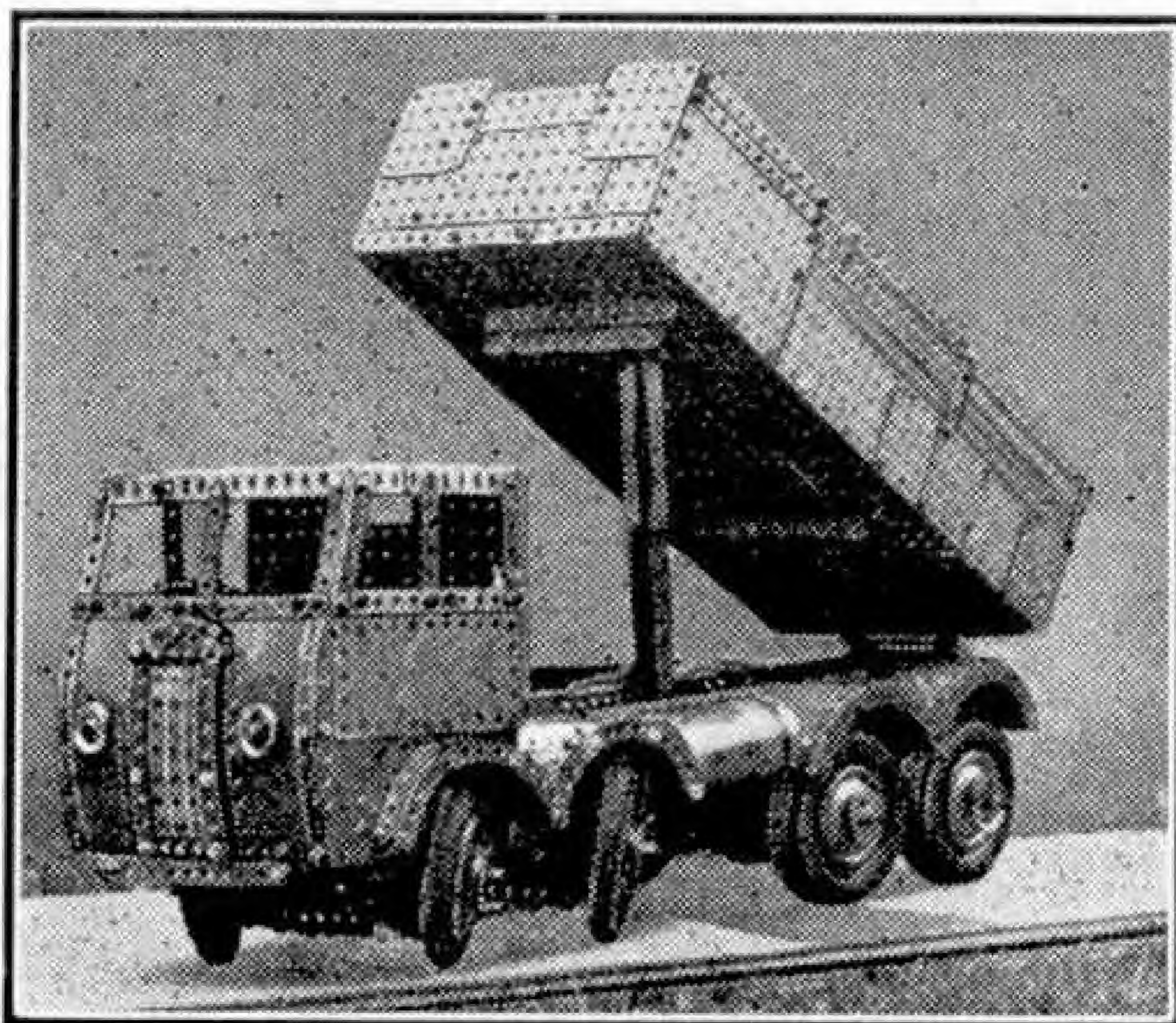
The entries in "B" Section of the September Model-building Contest, "A" Section of which was dealt with last month, were of a very high standard indeed and were remarkable for the variety and range of the models submitted. The list of prize-winners in this

Section was given in last month's "M.M.," and we now give details of specially interesting entries.

First Prize was awarded to J. H. Smith, Teddington, for a very fine model tractor and straw baler. The straw baler follows the harvester, which leaves the straw in rows on the ground, to be scooped up by a rotating spiked drum on this machine. Conveyors at right angles to each other pass it on to a double ram that compresses it and pushes it to an automatic knife that cuts off each bale at the correct length. The finished bale is tied up by wire and is ejected at the end of the machine. It will be seen that the

subject gives scope for intricate detail work, and Smith has taken full advantage of the adaptability of the Meccano system in designing his reproduction of it.

Second Prize in this Section was won by F. Rowland, Hazel Grove, nr. Stockport, who submitted two remarkably neat model haulage lorries of the 10 and 12 wheeled types. The 12-wheeler is illustrated on this page. Each model is fitted with a backward tipping device, in which a long Screwed Rod journaled in the chassis is driven from the engine, and both incorporate all the major details to be found in their prototypes, together with very efficient springs of the semi-elliptic type. Clever arrangement of Plates and Strips give a very



This fine 12-wheeled motor lorry won Second Prize for F. Rowland, Hazel Grove, nr. Stockport, in our September Model-building Contest, the results of which were announced last month. The tipping movement is driven by a separate mechanism placed at the back of the cab.

pleasing appearance to these entries.

Two models totally different in type, yet alike in their sturdy construction, won Third Prize for A. Short, Birmingham 17. One is a reproduction of a railway breakdown crane, an interesting feature of which is the gear-box, which allows slewing, luffing and hoisting to be carried out from a No. 1 Clockwork Motor accommodated at the back of the cab, and is remarkably compact, while giving ample room for the careful positioning of the various controls. The second model, a cargo boat, has a single funnel and a well-designed superstructure. Derricks fitted to the masts are used in conjunction with the three holds provided with detachable hatches. Many other working devices add to the interest of the model.

One of the most original entries was the model gramophone submitted by M. Davies, which was awarded a Consolation Prize. This is very simple, yet actually reproduces recorded sounds. It has a square soundboard suitably mounted on a base and fitted at one of its lower corners with a Coupling holding the needle. The record is placed on a 3" Pulley fitted with a Motor Tyre, and the drive may be effected through a Motor or by hand.

The appearance of new Army vehicles challenges model-builders to exercise their ingenuity in reproducing them. An excellent example of this is a prize-winning model "Jeep" submitted by W. Ralph, Pulborough.



Club and Branch News



WITH THE SECRETARY

A FITTING CLIMAX

With March we are approaching the end of the two Winter Sessions, and it is time to think of winding up the programme of the indoor season. This is best done by organising an Exhibition, at which models built during the winter by members can be displayed and other attractive features arranged for the benefit

of relatives and friends invited to be present. A Hornby railway, in thorough working order, is always one of the greatest attractions of assemblies of this kind. Most Clubs are associated with a Branch of the H.R.C., or have a Hornby Railway section, so that there is a little difficulty in arranging a good display. Sections concerned with model aircraft also could display some of their members' efforts, and special features such as pole flying could be organised. In fact the possibilities of making good displays are endless, and a pleasant touch can be given by presenting prizes won during the Sessions, including Merit Medallions, nominations for which should be sent in without delay.

The value of a Club will be judged on the show that it makes on such an occasion as this, and whatever is done therefore should be done well. Plans should be thought out carefully and rehearsal should ensure that all concerned do their parts efficiently.

The proceeds of any Exhibition of this kind can be devoted to increasing the resources of a Club, but at this time the Red Cross and other special wartime efforts should not be overlooked. A particularly good idea is to use funds raised in this manner for providing comforts of various kinds for members serving in the Forces. Except in a few Clubs recently started, officials and senior members who are taking active parts in the war effort are to be found on every Club roll, and it is good to remember them when a Club is showing its capabilities.

Proposed Clubs

- WORCESTER—Mr. R. C. Hawkins, 119, Bath Road, Worcester.
SOUTHPORT—Mr. F. Castle, 5, Clifton Road, Blowick, Southport.
BRIDGWATER—Mr. J. Pullen, Crossway House, Chedzoy Lane, Nr. Bridgwater.
ELY—Mr. L. J. Oakley, 13, Bull Lane, Ely, Cambs.
HARROW—Mr. J. Gtiggs, 21, Butler Road, Harrow, Middlesex.

Proposed Branch

- KINGSTON-ON-THAMES—Mr. J. Hathaway, 6, Cromwell Crescent, Kingston Hill, Kingston-on-Thames.

Recently Incorporated Branches

433. GAINSBOROUGH—Mr. F. T. Newman, 26, Birrell Street, Gainsborough.
434. HEMSLEY—Rev. B. G. D. Clarke, The Vicarage, Hemsley, Nr. Great Yarmouth.
435. BURNLEY—Mr. W. Lupton, 10, Beatrice Street, Burnley.
436. DURHAM SCHOOL—D. M. Griffiths, Faffinites, Durham School, Durham.

Club Notes

EXETER M.C.—Model-building continues steadily, cranes being special favourites. The Aircraft Section is doing good work, and a new Section has been introduced for the building of models of naval craft in match sticks. Up to 600 matches are used in constructing some of the models, and periodical knowledge tests are carried out. A novel scheme is the organisation of a Club Brains Trust, which answers questions of any kind from members. Football continues to be one of the chief activities, and 10 teams are now run. Club roll: 100. *Secretary:* J. Cory, 24, Clifton Hill, Exeter.

ACTON M.C.—Work continues on plans for the Club's new 4 mm. scale layout. At one meeting interesting films were shown, including one illustrating how P.O. engineers coped with difficulties caused by the sinking of an Underground escalator shaft. Other events have included Musical and Social Evenings, and the Annual General Meeting. Club roll: 13. *Secretary:* Mr. S. W. Simmons, 37, Derwentwater Road, Acton, London W.3.

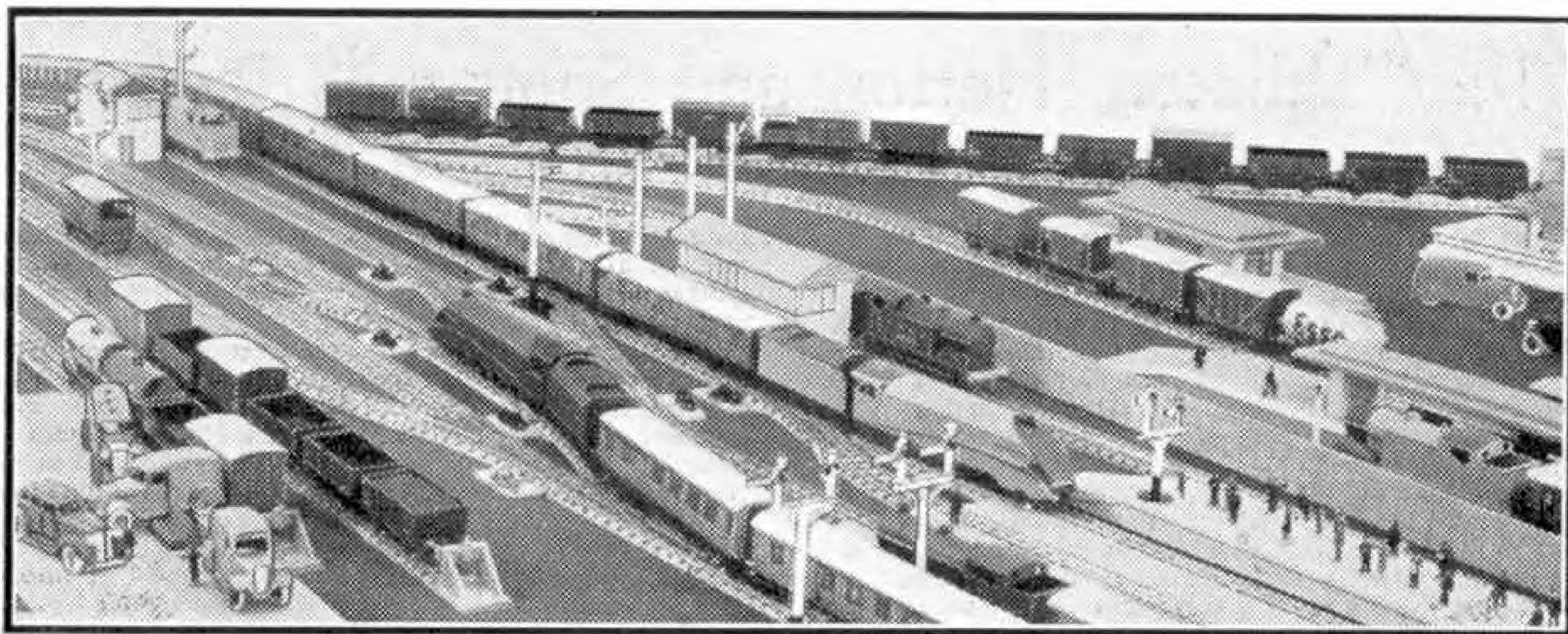
KING STREET LIBRARY, STRET-FORD, M.C.—Active model-building has continued under the Leadership of Miss Scott, who has succeeded Miss Carline. Lectures have been given by members on models they have built, and a similar Lecture has been given on aircraft modelling. Interest in aircraft recognition has grown and this subject is now included in the programme. Club roll: 20. *Leader:* Miss D. Scott, King Street Library, Stretford.



Mr. S. J. Carse is manager of the Waterloo (Dublin) Branch No. 295, Chairman, Mr. M. P. Dempsey, Secretary, S. B. Carse. Mr. Carse is responsible for the arrangement of programmes and the general supervision of Branch activities. The Branch track represents the line of the Kent and East Sussex Railway, and is very realistic in layout and operation.

Branch News

SALE—A considerable amount of work has been done on the Branch layout, and timetables for operations have been worked out. Special nights have been devoted to Competitions and to the making of models. An enjoyable Christmas Concert and Party was held. Lectures are given on the pre-grouping railways, an epidiascope and photographs being used for illustrations. Visits have been paid to stations. Monthly meetings in aid of Red Cross Funds are arranged. *Secretary:* D. Blackhurst, 21, Brookside Road, Brooklands, Cheshire.



Part of a large junction station with goods yard beyond. The dividing wall separates the main line section from the suburban side of the passenger station.

Some Hornby-Dublo Station Ideas

STATION arrangements in actual railway practice vary greatly according to traffic requirements, local conditions and so on. In miniature also it is possible to introduce a considerable amount of variation in station schemes, and in this article we consider one or two ideas that it is possible to carry out on Hornby-Dublo railways.

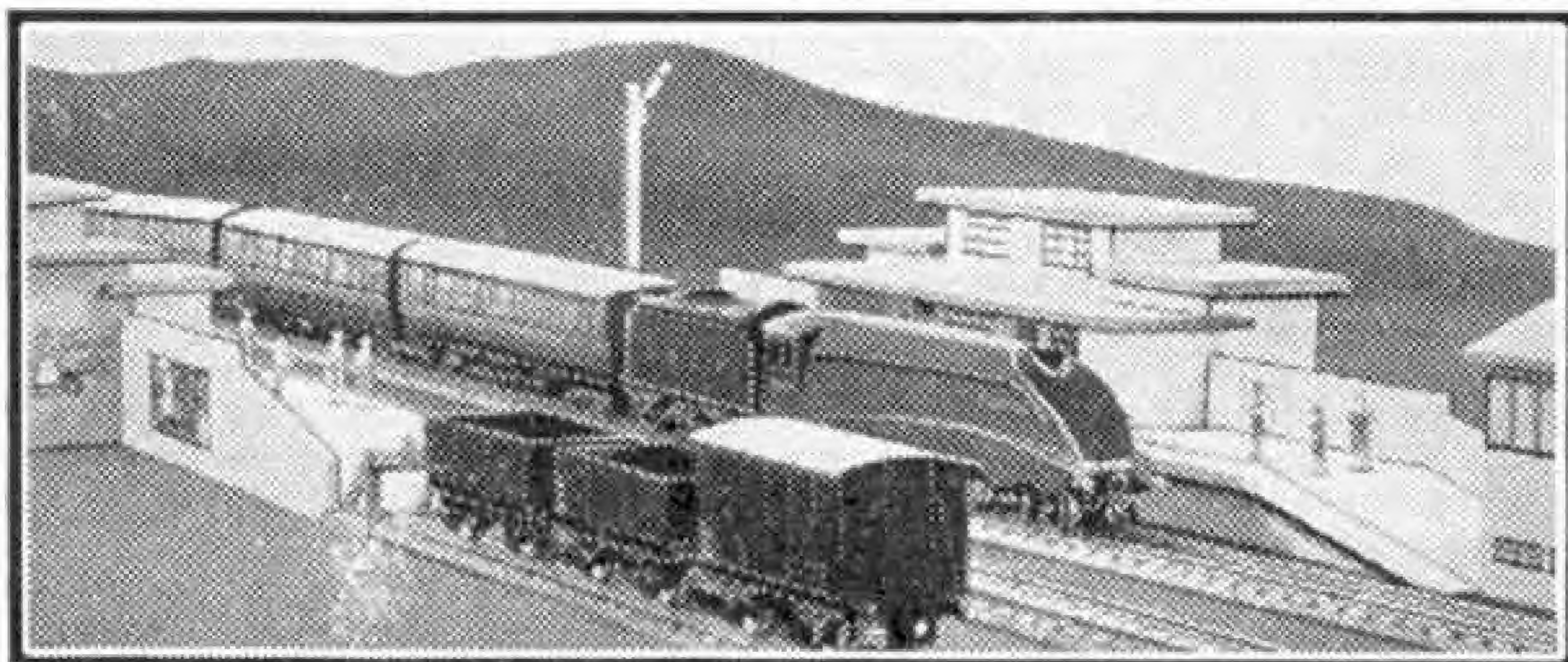
On a single line of railway the standard Hornby-Dublo Main Line Station provides all that is necessary for dealing with passenger traffic in the way of a platform, station buildings and offices. Whenever possible, however, the model railway owner usually likes to introduce a stretch of double track through the station by means of a loop-line arranged in the manner frequently described in these articles. It looks better, makes the station appear more important, and on a layout consisting otherwise of single track provides the means for up and down trains to pass one another. In such cases it is often the practice to use two of the Standard Stations, one opposite to the other, as shown in the lower illustration on this page.

In stations of the "inner suburban" type where no freight traffic is dealt with the arrangement just described is quite sufficient. As a rule, however, it is necessary to provide for local goods traffic, and arrangements will depend largely on the amount of space that is available. Possibly two or three sidings and a miniature Hornby-Dublo Goods Depot can be accommodated, and the complete station and yard then becomes quite self-contained from the traffic

point of view and much more interesting for operation. Even if the goods accommodation consists merely of a single siding the station becomes more railwaylike. Goods wagons can be shunted in and out, road vehicles can be backed up to them and the traffic generally conducted in a realistic manner. Where a fairly long siding is provided it can be used for storing empty coaches in between times of duty. After the last run of a particular episode or "working day" the coaches can be placed in the siding and can form the first train of the next spell of operations.

With the standard Island Platform other schemes suggest themselves. It can be used on its own alongside a single track to form practically the simplest pattern of station possible on a Dublo railway. Used in this way it is ideal for a branch line either as a terminus or an intermediate halting place. When employed on a branch terminus the line will probably extend past the end of the platform a little way in order to allow for a "running round" loop. In this way the presence of a sloping ramp at the terminal end of the platform will not appear out of place; in fact the ramp at this end would be used for passengers to gain access to the platform from road level, a building representing the simplest form of station office being made up at the foot of the slope. Such a realistic yet unorthodox arrangement would add considerably to the natural effect because of its extreme simplicity. When the Island Platform serves a single main line the unused platform face can always be considered "in reserve" as it were against future development. When perhaps the track is doubled this platform can be brought into use and the complete affair used as a true "island" between the two tracks.

The general features of the Island Platform are consistent with the design of the Main Line Station so that the two can be used together, particularly if there are the normal up and down main lines and possibly a track line in addition to be served. Even if there is no branch line it is common practice among Dublo owners to use the Main Line Station and the Island Platform together, the former on the inner side of the line, and the latter on the outside.



A wayside station on a Hornby-Dublo layout with an express entering. Note the wagons standing on the dead end siding.

The "Littleton, Merton and Southend" Railway

Interesting Layout in Gauge 0

AN interesting layout with a "freelance" name, but which reproduces the practice of an actual system, is the "Littleton, Merton and Southend" line, part of which is shown in the illustration on this page. This has been developed by our reader G. Hollis, until recently of Blackpool, but now on active service in the R.A.F., from one of the early Hornby Train outfits of 1924. Some of the original stock of this Set is still in use!

The railway is happily situated with regard to space, for it is laid in an attic measuring 15 ft. by 10 ft. The main line is double-tracked and is continuous, forming practically an oval following the walls of the room. On this main line "Littleton" and "Southend" stations are situated; near to "Southend" is the tunnel, of which one mouth is shown in the illustration on this page. A double junction connects the main line with an inner system of tracks which

running obtained through careful track-laying and general maintenance of track and stock. Five-coach expresses are usual and goods trains load up to 15 and 20 wagons.

Locomotive and rolling stock practice represents a combination of Midland and Lancashire and Yorkshire Sections of the real L.M.S. Thus the familiar Standard Compound of the Hornby Series is included in the locomotive stock and this engine appears in the tunnel illustration previously referred to. The biggest express tender engine is of the L.M.S. "5P" class and is appropriately No. 5702 "Colossus." This, like several other engines, was made at home. Horwich practice is represented by a model of one of the giant Hughes "Baltic" tanks No. 11110; this has a standard Hornby 20-volt mechanism adapted by the builder to suit the 4-6-4 wheel arrangement of the model. General freight and express goods

traffic is dealt with by a miniature "4F Standard Freight" of the class familiar all over the L.M.S. This also handles coal traffic, of which a feature is made both to supply the coaling stage and for shipment at the dockside. For this traffic, however, it is hoped to provide, among other future developments, a more suitable type of heavy goods engine in the shape of a model of one of the big Stanier 2-8-0s of the "8000" class.

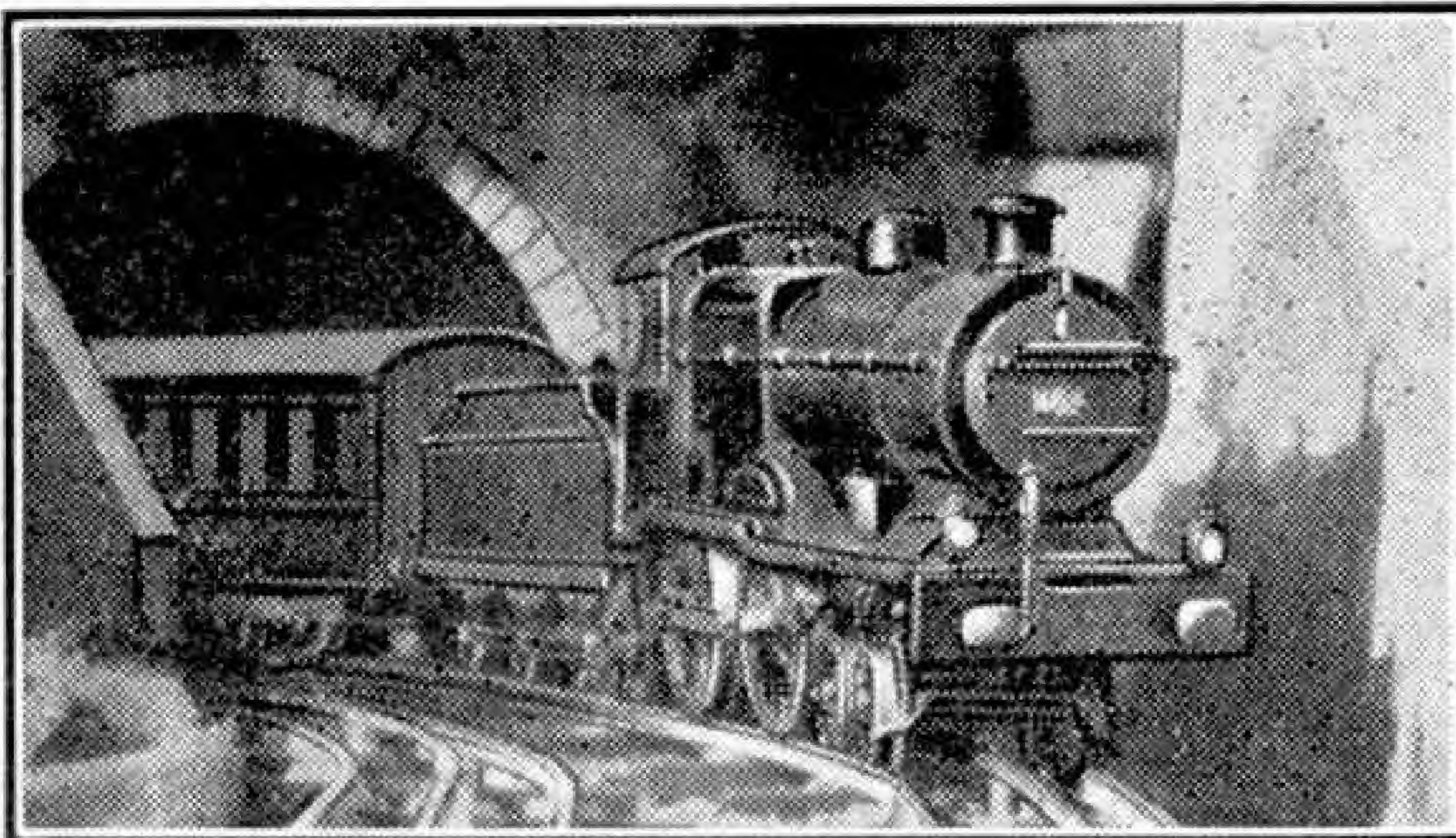
Other interesting engines include various veterans of Hornby classes long obsolete, such as the old No. 1 and No. 2 Lank, and there is a 4-4-2T with a Hornby Clockwork mechanism that has been in continuous service for eight years. Older Derby practice is represented by No. 1420, a Midland 0-4-4T, and for motor train service there is one of the typically "Lanky" 2-4-2 tanks that still do so much work on the real "Central Division."

There are in all 18 engines and among some of the more interesting rebuilds is a former Swiss-type Hornby electric model that has been modified to represent a Diesel shunter. Several other engines have been altered in various ways to suit the standards of real practice that are represented.

There are 15 bogie coaches of which many are Hornby, the remainder being made at home. Various four wheelers are in use for miscellaneous traffic, including the original vehicles mentioned previously. Goods stock includes most of the standard Hornby Wagons and Vans, the latter being particularly in demand for "fitted" or express goods trains. The total of goods and passenger rolling stock is 55 vehicles and the total "track mileage" in use is over 200 ft.

The steamer previously referred to at the quayside is named "Emperor" and represents a cross-channel packet. It is made of Meccano parts. Various Dinky Toys aircraft are in use at the airport. Attention has been paid to the surroundings of the line so that different kinds of scenery are in evidence at different points. Ordinary countryside represented on a scenic background gives way to more severe hilly scenery in the neighbourhood of the tunnel, and there are cuttings, hedges and so on. Buildings of several types have been constructed and these all add to the generally realistic effort.

Formerly a Meccano prize-winning model of a coaling plant was included among the lineside features, but this has been dismantled to make room for other recent developments. Posters, Hoardings and Miniature Figures add "life" to the stations and premises.



Hornby L.M.S. Standard Compound No. 1185 emerging from the tunnel on the layout of G. Hollis, Blackpool, described on this page.

are arranged to lead to the terminus "Merton," and to serve two engine sheds, a coaling stage and various sidings. The coal stage road cuts diagonally across the operating space inside the layout and is arranged to provide the means of turning the engines round, as there is no turntable.

A branch line taken off the main outer track near "Littleton" serves a quayside where there is a model steamer. Passing the quay it is extended further to "Littleport" aerodrome, and the most recent development has been to raise the latter part of this track so that it swings across the main line on an overbridge and terminates in an elevated siding and "run round" loop. The most important express on the line is the "Yorkshireman," which runs between "Merton" and "Littleton." Time-table operation is the rule and some 30 separate train workings are included in a space of four hour's operation. Both clockwork and electric locomotives are used, and to supply power for the latter Meccano 120A and 122M Transformers are employed. Current from these is also used to operate the automatic colour-light signals recently installed. Local passenger and all types of freight services are operated and connections on the branch line between "Littleton Junction" and "Littleport" are provided by means of a "push and pull," or "motor run" as frequently suggested in our articles.

The rails in use are partly Hornby Tinplate and partly small scale permanent way. Most of the points have been assembled at home from the latter material. Heavy loads are the rule, as a result of the easy

"Going Great Western by Hornby"

ON account of the characteristic individuality of so much of its practice and equipment, the G.W.R. has long been a favourite with the miniature railway owner who wishes for "something different" in the working and stock of his line.

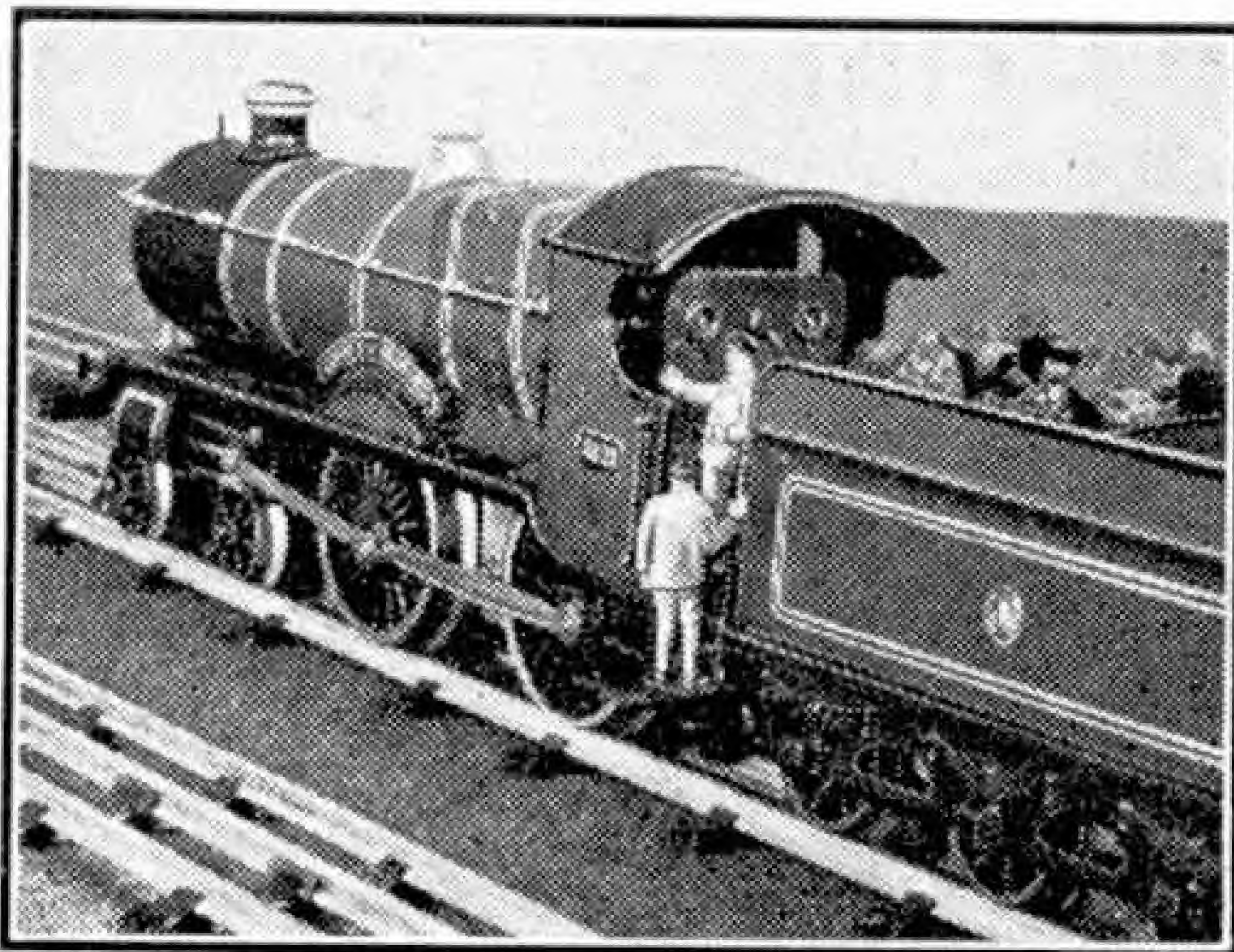
A splendid variety of G.W.R. expresses can be run with Hornby Locomotives and Coaches. The No. 2 Corridor vehicles are exactly what is required to make up a miniature "*Cornish Riviera*" or "*Torbay Express*." The attractive brown and cream colour of G.W.R. passenger stock is perfectly represented in the finish of these Coaches, together with the flush sided construction of modern corridor vehicles, so that the appearance of such a train is very fine. Corridor Connections, Train Name Boards, and of course Tail Lamps complete the realism. Where any particular titles are not included in the Train Name Boards of the Hornby Series, the model railway enthusiast will not find it difficult to make them himself by the use of Indian ink lettering on strips of white or cream card cut to the size required. The West Country, the South Wales and North West services to Birmingham, Shrewsbury, Chester, and so on can be run in turn.

The G.W.R. make good use of capacious bogie vans, some of them of special construction for mails, newspapers, milk and similar freights that are conveyed by various "night flyers," either in complete train loads or in single vehicles attached to passenger trains. For similar purposes in miniature there is the Hornby No. 2 Luggage Van, which is generally similar in construction to the Swindon "*Siphons*" and "*Monsters*," as some of them are known in the peculiar code that is used in referring to them. A No. 2 Cattle Truck will do almost as well, at all events to represent a ventilated van such as the "*Siphon G*," which is used for milk traffic particularly.

For express passenger work and for fast van trains for traffic of the kind just referred to, first choice in the matter of Locomotives would no doubt be either the E320 "*Caerphilly Castle*" or E220 "*County of Bedford*." The former is the bigger engine of the two, and bears a famous name, but the latter is more true to type and has practically all the features that have been characteristics of Swindon-built engines for the past 30 years. This standardisation of G.W.R. locomotives makes it possible to use, say, the Hornby "*County*" to do the work of any of the large tender classes either on passenger or goods traffic. The Cornish fliers, Ocean Mails, Meat Specials or South Wales coal trains can all be

"County" hauled quite reasonably.

Standard G.W.R. features are found also in the smaller Locomotives of the Hornby Series finished in the styles of that company, so that the handy "Moguls," and the various tank classes for suburban work, can all be represented.

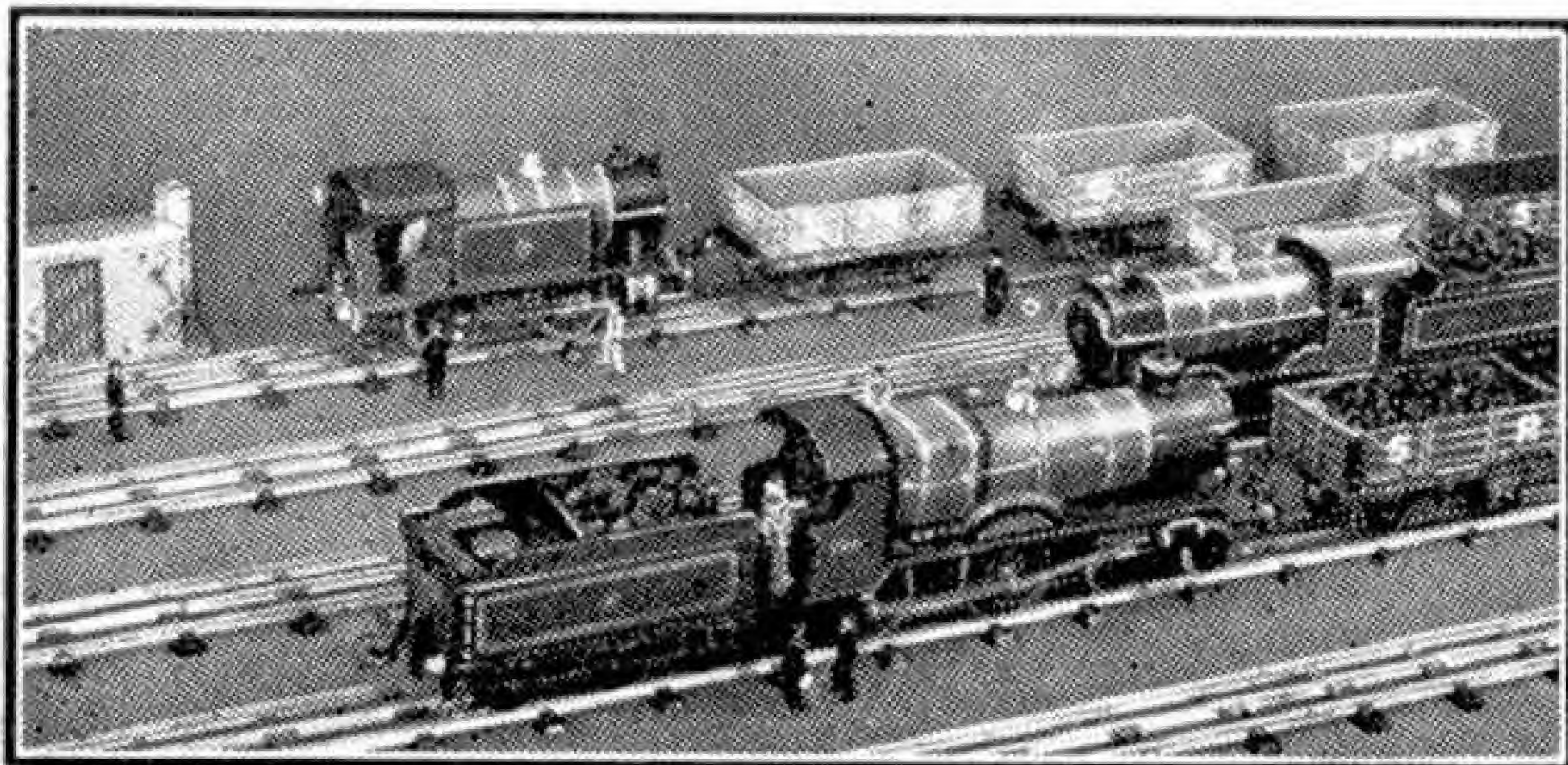


A splendid G.W.R. Locomotive of the Hornby Series, No. 3821 "*County of Bedford*." Note the realistic attitudes of the "crew."

"Push and pull" trains form a favourite item in the G.W.R. operating programme, and we have frequently recommended this type of train to Hornby Railway owners, either for branch line work or to supplement the normal stopping train services. An interesting unit of this kind can be made up of a single brake-third No. 2 Coach and an M3 or No. 1 Tank, the driver being supposed to ride at the end of the luggage portion of the vehicle when the engine is pushing the train. Alternatively a No. 2 Pullman could be used; its colours are very similar to those of the G.W.R. coaches, and it could resemble fairly well one of the special centre corridor trailer cars often used for "push and pull" services.

On the freight side much can be done with Hornby Wagons and Vans based on G.W.R. patterns, such as the "*Boiler Trolley*" of the Hornby Series, which will do very well in miniature to represent a "*Crocodile*," as the bogie well wagons are known on the line. Bulky loads of engineering material made of Meccano

Parts will make splendid loads. Express goods trains can include a Hornby Open Wagon "B" fitted with a tarpaulin bar running lengthways, just like the real "*Open A*" and "*B*," the former being brake-fitted for running in fast trains. Loads that require sheeting, such as certain agricultural produce, are frequently carried, so that the Hornby vehicles can be included in any perishable traffic train. Model meat or fish trains on a G.W.R. system can be provided with the appropriate vans, for the Hornby No. 0 Meat and Refrigerator Vans reproduce the style and finish of the real "*Mica A*" and "*Mica B*" vehicles.

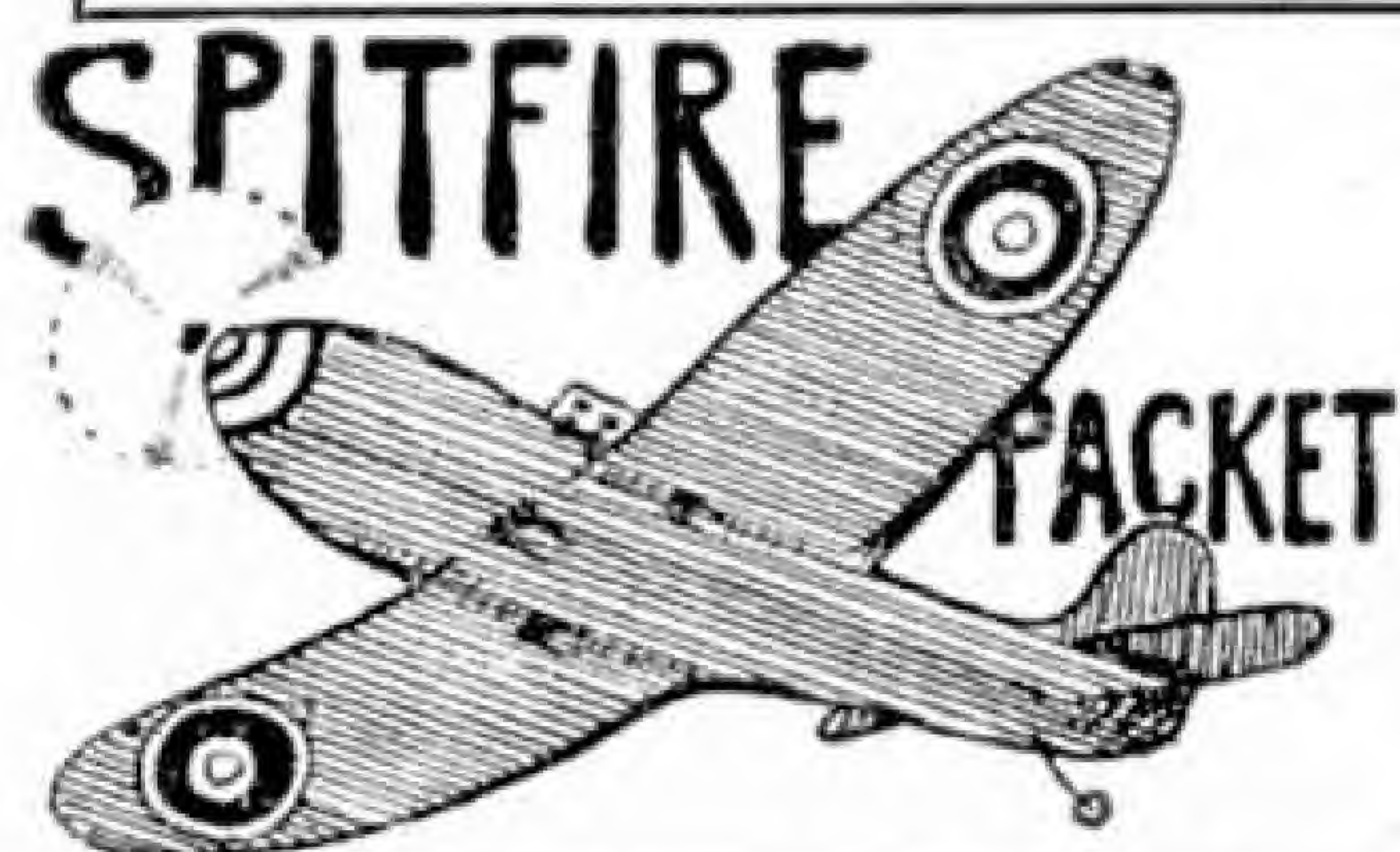


In the sidings, coal traffic and empty wagons being dealt with in a miniature G.W.R. system.

FOR SERIOUS COLLECTORS

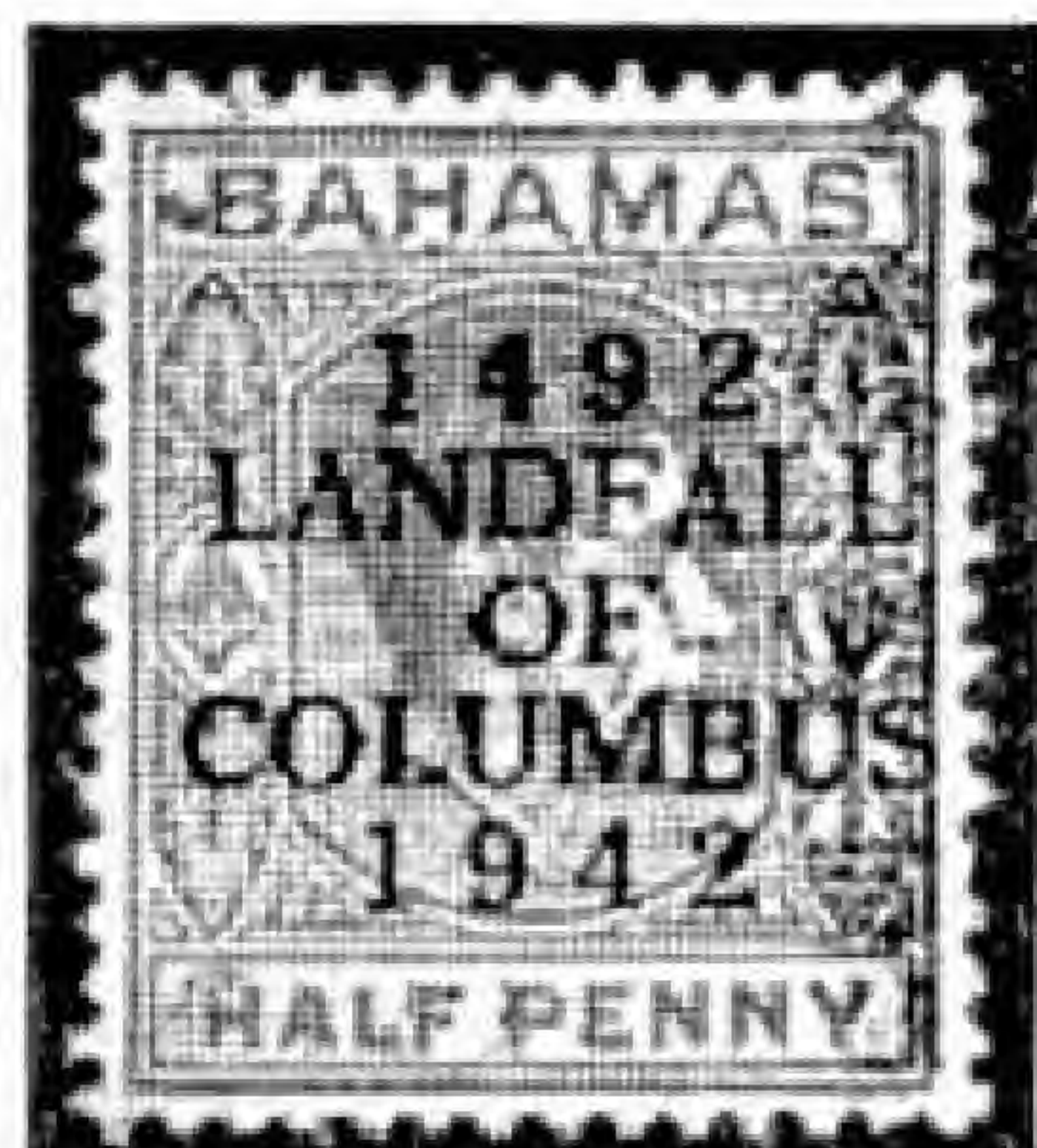
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Other Stamp Advertisements on pages 104 and v.

Stamp Collecting

Stamps of the Free Countries. No. 2 Brazil

By F. E. Metcalfe



WHILST the ubiquitous "Penny-Black" was being discussed recently at a philatelic meeting, someone slyly asked which was the country that issued the second stamp, and not everyone knew. And fewer still remembered the name of the second

The lover of pictorial stamps does not get his innings until 1900, when a modest set of stamps was issued to commemorate the fourth centenary of the discovery of Brazil by the Portuguese.

Yes, Brazil went for nearly 60 years before she issued a single commemorative stamp, and another six years before the next effort in the same

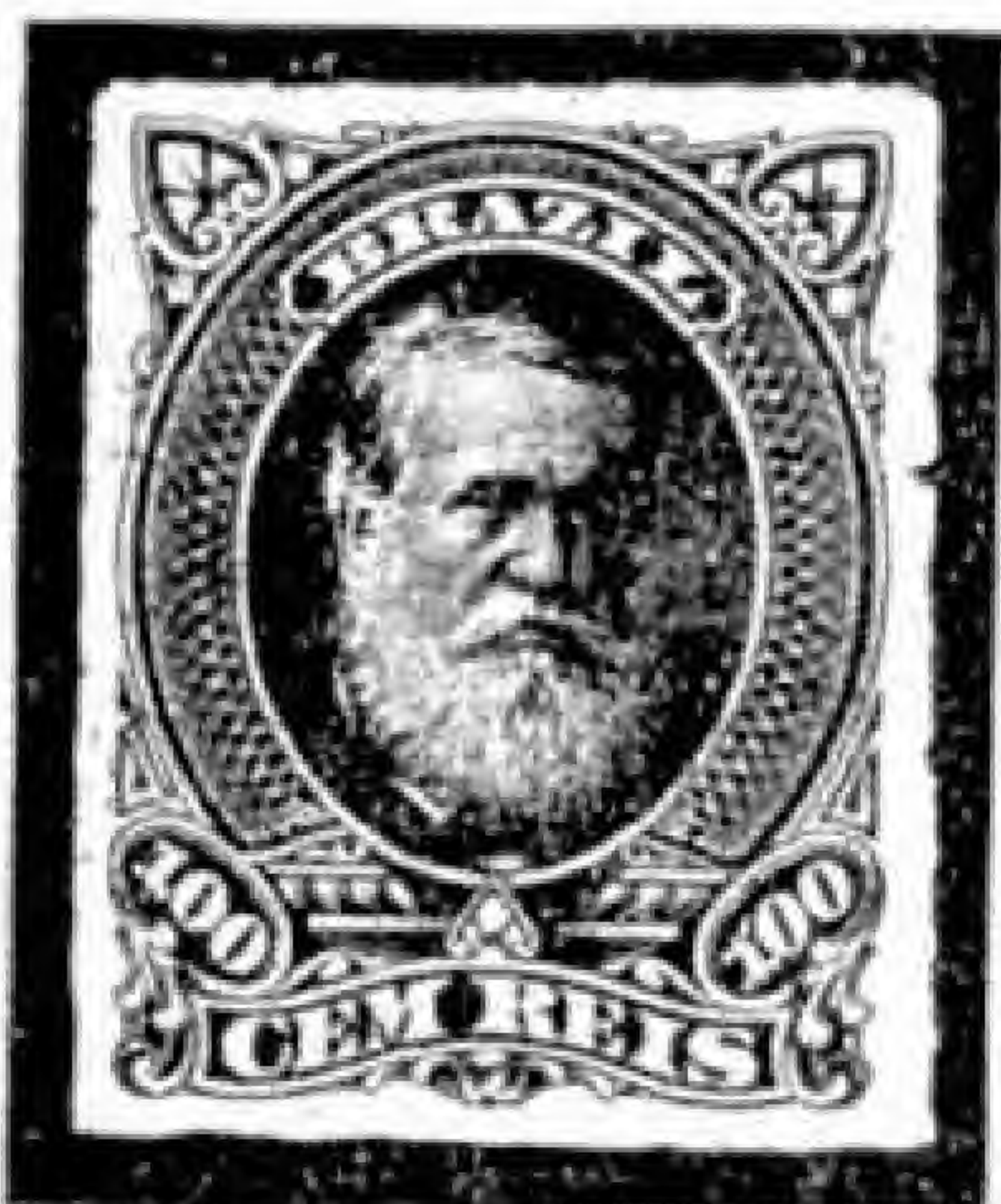


country to issue stamps.

France, Germany and the U.S.A. were all named, but of course it was none of these, for our gallant friend and ally Brazil can claim the honour. Very shortly it will be celebrating the centenary of its famous "Bulls-Eyes," or as it prefers to call them, its "Ox-Eyes," which were issued as long ago as 1st July 1843.

Such an event will no doubt be commemorated by a new set of stamps. Let's hope that something better than our own somewhat uninspired effort will be the result. The task should not be too hard.

The genesis of Brazil's first postage stamps has always been rather a mystery, and though Gibbons with assurance state in their catalogue that these stamps were engraved and printed in Rio de Janeiro, there is reason to believe that the dies were actually engraved in London, though no doubt the stamps themselves were printed in Brazil's capital.



These "Bulls-Eyes" were only on issue for a year; then came the "Cats-Eyes" stamps of a somewhat similar design, but smaller in size, and what is more to the point for many of us, more modestly priced in dealers' stock-books.

the same policy, opponents of commemorative stamps would be without a leg to stand on.

Of course there are lots of collectors who are genuinely not interested in pictorial stamps. The search for watermarks, perforations, retouches, etc., are their preference. Well, the ordinary issues of Brazil are exactly their cup of tea, if they set to work separating the various watermarks of modern Brazilian stamps, but they are assured grand fun as their reward. And perhaps profitable fun too, for few dealers go to the trouble of sorting these stamps, and as many are scarce there is a chance of real finds for a few coppers.



Brazil is of course still producing attractive stamps, but alas, currency restrictions prevent their importation in a mint state. For the time being one must be satisfied with the odd copies which trickle through on attenuated commercial mail, which is a great pity for those of us who collect Brazil, but let's hope we can catch up after the war.

Recently there has been an interesting currency development in Brazil and those familiar words reis and milreis will, after 99 years disappear from its stamps.

There is already news that the current set has been surcharged, but none of

(Continued on page 105)



But it is not until the justly popular "Dom Pedros" that we really come to the stamps within the reach of all of us, and no stamps are more worthy of a place in our albums. Dom Pedro II, Emperor of Brazil, the courtly figure depicted on the stamps, did not find life too easy, and when he fell and the republic was proclaimed, stamps—dull enough in appearance to satisfy even our own authorities—were issued. But whatever their appearance, philatelists find them interesting enough.

The motif on these stamps is the Southern Cross; just about the most disappointing sight the eager northerner is likely to find in the southern hemisphere, lacking as he does the necessary southern imagination to fathom where the cross comes in.

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The first stamp comes from **NYASALAND** and has only just been issued. It is in a new colour due to a wartime change in postage rates, and shows a man-eating Leopard (the symbol of the Nyasaland Protectorate). The next Free Stamp is a most unusual issue. It is in two languages (English and Arabic) and comes from the Biblical land of **TRANS-JORDAN**, a really very scarce country from which



to get stamps. We believe that neither you, nor your friends, are likely to have these stamps already in your collection, and so give you this grand opportunity of obtaining them **ABSOLUTELY FREE**. To obtain them, all you do is: (1) Write clearly your name and full address. (2) Ask for this Free Packet. (3) Ask to see our Approvals and Lists. (4) Enclose 3d. in stamps to cover costs: and (5) Post your application to: **WINDSOR STAMP CO. (Dept. M), Uckfield, Sussex**

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Stamp Gossip

and Notes on New Issues

Attractive Ceylon 5c Stamp

There are several new stamps worth our attention this month. Alas, lack of space prevents all being illustrated, but room must be found for stamps like the recently issued 5c. value of Ceylon. Recess printed in green and orange, by Messrs. Thomas de la Rue, it is a rather attractive stamp, a bit garish perhaps in our western eyes, but things look differently in colourful Ceylon.



There is news that for the duration of the war at any rate Ceylon may get her stamps printed in India, and new designs are said to have been prepared already. This has been suggested as a good idea. It may be while the war is on, but afterwards we are going to need all the jobs we can find. Hitherto Great Britain has probably been the leading country in the art of stamp printing, her own issues notwithstanding. May she thus resume after the war.

New Zealand 1942 Health Issue

Other interesting stamps recently to hand are the two health stamps of New Zealand for 1942. The design is perhaps the most apt to date, but latterly there has been rather a sameness in the general appearance of these stamps, and as their sale depends to some extent, good as the cause may be, on their attractiveness, a complete change another year might prove not unprofitable.



The two high values of Tonga, 2/6 and 5/-, have now appeared on "script" paper and handsome stamps they are too. Those who go as high as this will have two fine additions to their collections, but there can be nothing in the suggestion that Tongan stamps on Crown Agent's paper are likely to have a short life, for the use of the turtle watermarked paper for the recently issued 1½d. value cannot mean more than that a small balance was being used up.

South Africa continues to turn out the "bantams." The latest values to appear are the 3d., 4d., 6d. and 1/- denominations. The design of the 4d. stamp has been entirely changed. It now shows a gun in a concrete emplacement. No doubt this set will be completed in the next month or so. We will then make some suggestions as to how it should be



collected, for this matter is causing some discussion among collectors.

And what about new foreign stamps? Of course there is no shortage of these, but mint copies are not easy to come by; however, two very interesting stamps have come our way this month. One is from Bolivia. It was issued to commemorate, as it says, the first scholar's philatelic exhibition at La Paz. A nice gesture, but can one imagine our own authorities being so obliging? As can be seen, the design incorporates pictures of Bolivia's first stamps, as well as one of its current air stamps.



Recently there has been some mention of a stamp which was actually prepared, but never issued, in memory of the passing of King George V. The idea was vetoed. Finland however has apparently gone through with a similar enterprise, and we are able to illustrate a stamp issued in memory of the late President

Hyosti Kallio. A significant thing about this stamp is that English, of all languages, has been used for the words "In memoriam." The stamp is recess printed in black, and the bar of music is part of the National Anthem of Finland. Altogether an interesting stamp.

Stamps of Brazil— (Continued from page 103)

these stamps is yet to hand, so pending their arrival we shall have to leave the discussion of them until a later date. In the meantime collectors will be wise to fill the blanks of the set to be surcharged.

And what of the country itself? Well, we have little space left to discuss it so we shall have to content ourselves by saying that it once provided us with the greatest thrill the world can possibly provide, for we sailed into Rio Harbour when the Sun was rising. Then the mountains framing the bay were painted from a palette not of this common earth, and fronting us was the luminous capital city. To see Rio de Janeiro is to have lived. Brazil is a great country, with grand stamps.



A Footplate Trip on the C.P.R.—

(Continued from page 75)

to nearly 20 minutes. "The Dominion" got away at 7.10, in the beauty of a perfect Spring morning. No. 2850 thrashed along past lakes and rocky outcrops, through forests of fir and birch, past lonely "pioneer" farms isolated like oases in the wilderness that extends without a break to the Arctic.

It is double track to Winnipeg, the old original line being used for Westbound traffic, so we were on it. When the line was duplicated, chiefly because of the tremendous Autumn wheat movement to Fort William, the new pair of rails was better located, with far easier grades. This solves the puzzle I mentioned a little way back—why Eastbound trains have better grades than Westbound ones. We had made stops at Keewatin and Ingolf, and now halted again at Whitemouth, our last port of call before Winnipeg, and took water. Rocks and lakes had been left behind, and the track no longer twisted and turned, but stretched ahead straight and level. We were entering the prairie, that lay like a vast 900 mile wide wheatfield, extending right to the foothills of the Rockies. So far, the left-hand track had been followed from Fort William, but now a "fly-over" took us across the Eastbound track, to put us on the usual right-hand side when the two lines came together again. They had often been out of sight of each other for long distances. The country still showed many trees, but it was dead level. Soon we saw outlined ahead the tall buildings and factory chimneys of Winnipeg. In a few minutes we were entering it, and with her bell clanging, No. 2850 clattered over crossings and switches into the Depot, coming to a stand at 10.20 a.m., dead on time. "The Dominion" was half-way across the continent, and 419 miles west of Fort William, the distance having been covered in 10 hours 53 minutes, at an average speed of 38.5 m.p.h., in spite of half-a-dozen stops.

N.B.—I have just discovered I must have forgotten to put my watch back one hour at Fort William, so all the times given in this article are an hour fast! To make them fit the C.P.R. timetable, we left at 10.27 p.m. and arrived at Winnipeg 9.20 a.m. but as this leaves the speeds mentioned unaffected, it does not matter. Distances in America are big; watches have to be put back four times when you cross the continent going West, and sometimes one forgets!

The Wizardry of Welding—(Continued from page 77)

or drilled before the error is discovered. The welding operator cleverly fills up the hole that should not be there, or adds new metal when too much has been turned off. Thus faulty parts are not wasted.

It is a far cry from the picturesque blacksmith's shop, where welding is often a matter of hammering together two pieces of white-hot metal, to the almost inconceivable temperatures for which scientists have found means to control. Nowadays extreme heat is a faithful servant to those who have acquired the great skill and experience necessary to make them master for the needs of mankind.

More About Airborne Troops—

(Continued from page 80)

to send there. Worst of all, we had not the proper ground weapons with which to defeat the dive-bombers. In spite of that our little force of artillery and our infantry with rifles and machine guns slaughtered thousands of Germans as they landed, till our people were overwhelmed by numbers. Against troops with proper air support and proper ground weapons such a thing could not happen.

Our Airborne Forces have their own methods of attack, which of course cannot be explained here.

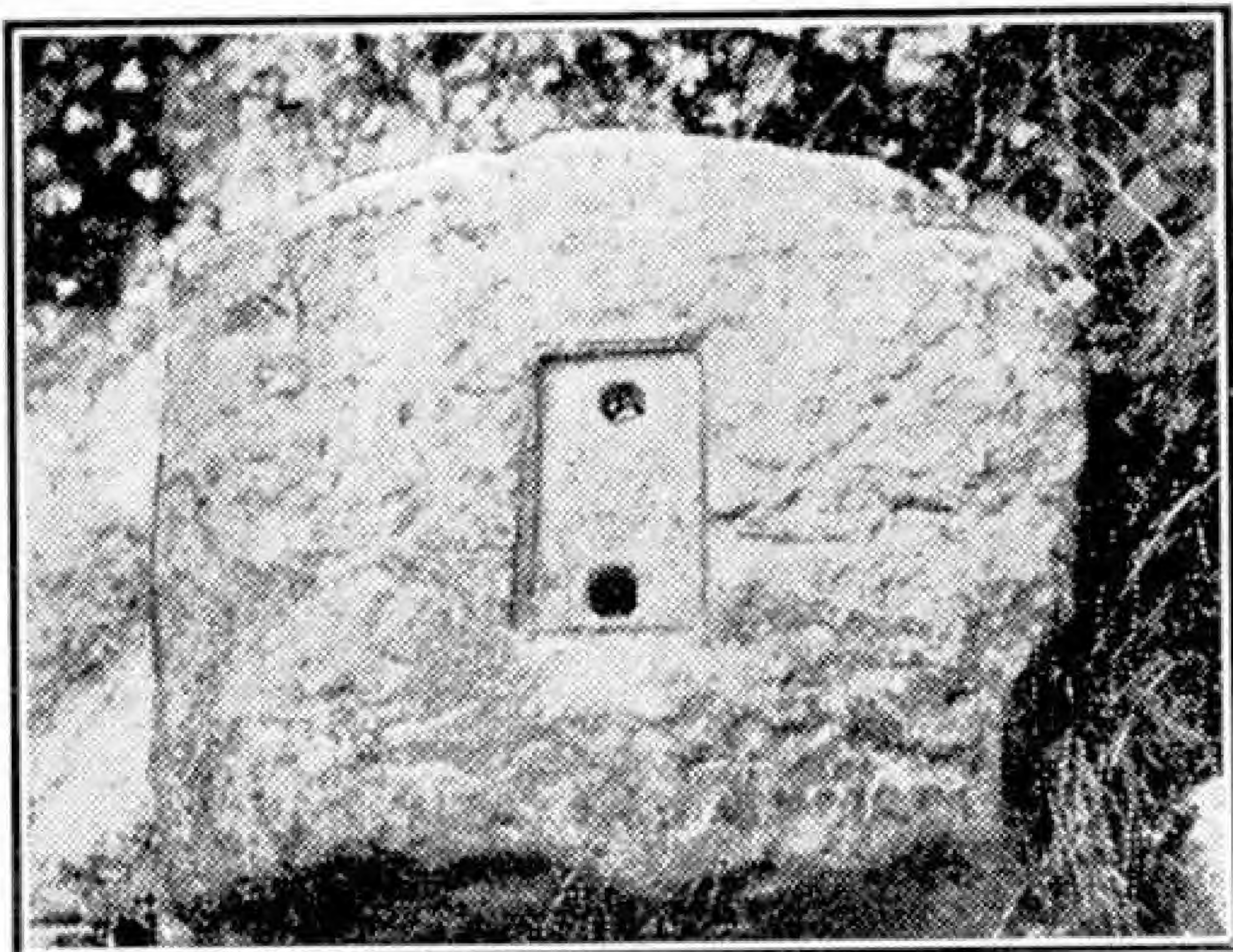
But you can take it that, if only the High Ups in the Army realise what can be done with airborne troops and will back the development of the new arm, some very important work will be done by parachutists and glider troops when the big war starts on the Continent of Europe.

Famous Engineers: Robert Fulton—

(Continued from page 85)

launched on 29th October 1814 amidst great public enthusiasm. On her trials in the following year she made, under her own steam, no sails being used, a trip of 53 miles in 8½ hours. Later, with ammunition, stores and most of her guns on board, she made an average speed of 5½ m.p.h. She was never completed for service on account of the termination of the war between Great Britain and the United States. She was used as a depot ship until 4th June 1829, when she was destroyed by an explosion.

Fulton died on 23rd February 1815 in his fiftieth



An old stone railway sleeper. This discarded relic of pioneer days is to be seen beside the Preston-Wyre line, and is of special interest now that a modern counterpart in the form of a concrete sleeper has made its appearance. Photograph by W. S. Garth, Luton.

year. He was not the inventor of the steam-propelled ship, but was certainly the pioneer of commercial steam navigation.

COMPETITION RESULTS**HOME**

December Hidden Words Contest.—1. D. J. W. Brough, Cleam. 2. E. G. Smith, Manchester 21. 3. M. R. Davies, Weston-Super-Mare. Consolation Prizes: R. Parker, Coventry; J. Staley, Sutton Coldfield; F. Mills, Kearsley.

December Advertisement Letter Square Contest.—1. M. R. Davies, Weston-Super-Mare. 2. T. D. Tasker, Barnsley. 3. R. L. Pellatt, Manchester. Consolation Prizes: G. D. Bainton, Uxbridge; A. G. Bowsher, Oxford; R. Ritchie, Glasgow W.3.

January Locomotive Pie Contest.—1. R. P. Walford, Newton Abbot. 2. W. Finch, Birmingham 28. 3. E. Peet, Wigan. Consolation Prizes: G. E. Wrayford, Bovey Tracey; R. H. Green, Torquay; J. E. Lloyd, Coventry.

January Photographic Contest.—1st Prizes, Section A: J. W. Terry, Epsom; Section B: J. Cumming, Watford. Second Prizes, Section A: J. Cowpertwait, Leicester; Section B: N. Bentley, Leeds 6. Consolation Prizes: R. Atkins, Eccles; J. Durey, Newcastle-on-Tyne; L. Williams, Liverpool 17; T. Bird, Luton.

January Cover Voting Contest.—1. B. Harris, Gloucester. 2. J. S. Sykes, Darlington. 3. B. Ward, Radlett.

Competitions! Open To All Readers

A Knight's Tour Puzzle

Our competition this month is a particularly interesting one, in which entrants are asked to decipher a passage that has been disguised by means of a very simple code. The words making up the passage are given in the spaces in the accompanying diagram, which number 64, as on a chess board, and it can be read by starting at a certain point and moving about the board as the Knight does in a game of chess. It will be found that every square in turn is visited in this Knight's tour, so that every one of the 64 words in the message is revealed.

Those who are chess players will have no difficulty in making the tour, and so in decoding the passage, and those who are not familiar with the game will find it very easy to learn the move. Starting from any square, a Knight moves two squares horizontally or vertically in either direction, and then one square in the opposite sense. If the first part of the move is two squares up or down, then the second part must be one square to the right or, to the left. Similarly a two-square move to right or left must be completed by a one square move up or down. Thus from any one position in the centre of the board a Knight has eight possible moves open to it. One on the edge of the board has four possible moves, unless it happens to be in a corner square or in a square next to this, when the number of moves possible are two and three respectively. Once the move has been learnt, then all that is

necessary is to find the starting place, and to make one Knight's move after another, selecting the particular one out of those available that seems to lead to the best results. When the passage has been worked out it should be written out, on a postcard or a sheet of paper, and forwarded to "March Knight's Tour Contest, Meccano Magazine, Binns Road, Liver-

get	the	from	salts	much	best	now	in
the	of	to	The	won	it	too	known
to	the	sea	taking	Earth's	The	are	is
gold	sea	ages	sea	water	up	of	cost
gold	gives	its	the	been	salts	these	there
but	and	has	for	taste	One	would	these
which	out	other	yet	common	the	but	of
many	as	salt	of	metals	it	is	ocean

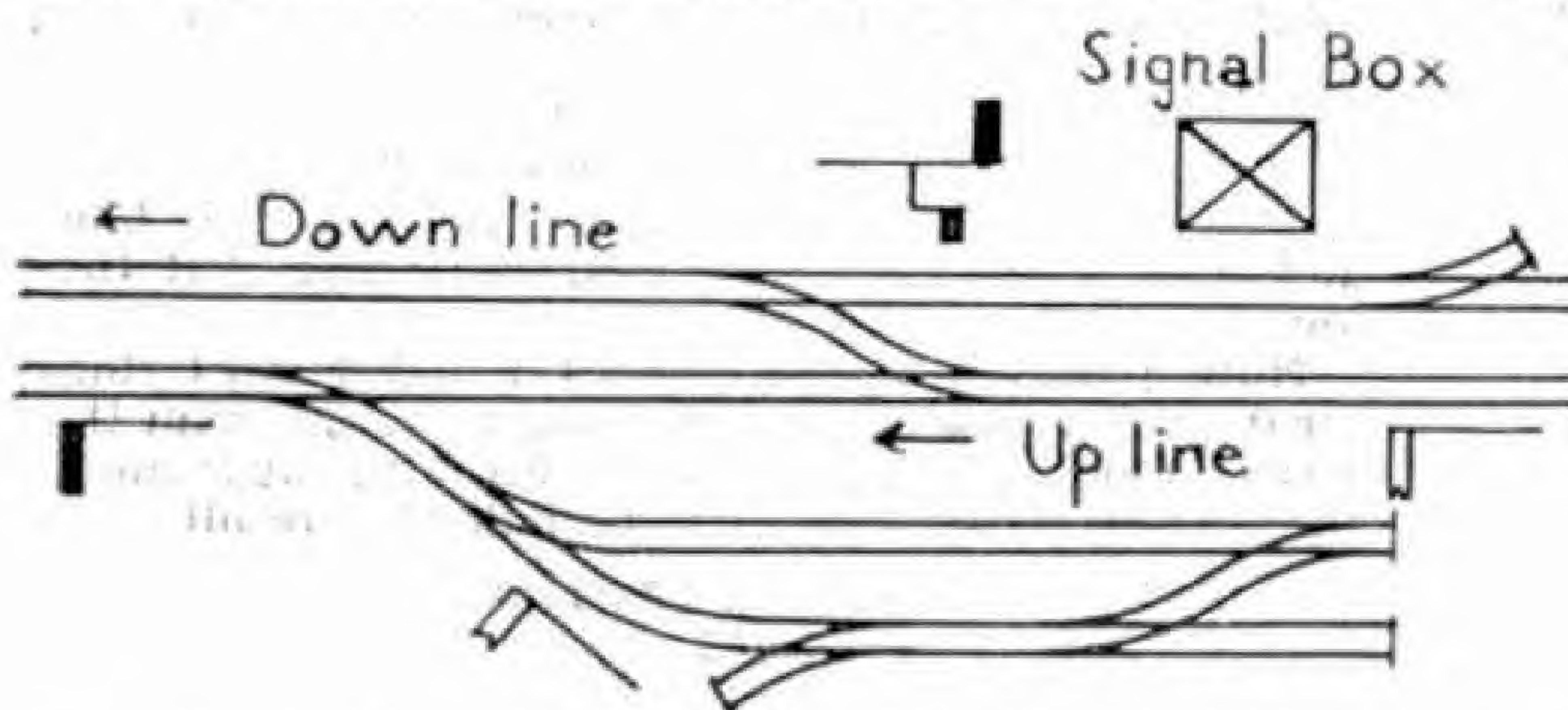
pool 13." Competitors must remember to put their names and addresses on their entries.

As usual there are two sections in this contest, for Home and Overseas readers respectively. In each section prizes will be awarded of 21/-, 10/6 and 5/- for the best entries in order of merit, and there will be consolation prizes for other entries that deserve recognition. If necessary the judges will take novelty in presentation into account in making their awards.

The closing dates are: Home Section: 31st March; Overseas Section, 31st July.

What is Wrong with this Diagram?

A feature of all signal cabins is the track diagram that sets out before the signaller the area under his



control. As the subject of our railway competition this month we show such a diagram in which various mistakes have purposely been incorporated. For instance the crossover points connecting the up and down main lines are shown "facing," whereas in normal practice they are invariably "trailing," unless there is some special reason for having them otherwise. Competitors are required to say what the mistakes are, and to give a brief note of explanation on each one.

There will be the usual two sections in this contest, for Home and Overseas readers respectively, and in each prizes of 21/-, 10/- and 5/- will be awarded for the best solutions in order of merit. In addition there will be consolation prizes for other deserving

entries, and where there is a tie for any prize novelty and neatness will be taken into consideration by the judges.

Entries should be addressed "March Track Diagram Contest, Meccano Magazine, Binns Road, Liverpool 13." The closing dates are: Home Section, 31st March; Overseas Section, 31st July. Competitors are reminded that they must give their names and addresses on each sheet of their entries, and they must not cut out the printed diagram. All readers of the "M.M." are eligible for this contest.

March Photographic Contest

This month's photographic contest is the 3rd of our 1943 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if desired, but entries in which the second condition stated above is not observed will be disqualified.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed "March Photo. Contest, Meccano Magazine, Binns Road, Liverpool 13." There will be separate sections for Overseas readers.

In each section prizes of 15/- and 7/6 will be awarded, together with consolation prizes for other good efforts. Closing dates: Home Section, 31st March; Overseas Section, 31st July.

Fireside Fun

"I'm buying a lawn-mower for my husband's birthday?"

"A surprise?"

"Rather. He thinks I'm giving him an 'easy' chair."



"Now remember we are a big family, and you must have confidence in the elders of the regiment. I am the father of the regiment. Do you understand?"

"Yes, Dad!"

"You look worried. What is the matter?"

"Our little Tommy is in financial difficulties."

"At his age? Nonsense, he's only five, isn't he?"

"Yes, but he's swallowed a penny."

"I was in the jungle when suddenly a horde of savages swooped down upon me."

"Good heavens! Whatever did you do?"

"I stared at them till I was black in the face and they took me for one of their own tribe."

"You are soaking, Willie. Whatever have you been doing?"

"Don't be angry mother. I have just saved three other boys from drowning."

"However did you do that?"

"They were just coming on the ice when I fell through."

"Now, when we cross the road, my dear," said the old lady to her friend, "don't look round, because then if a motor hits us in the back it's their fault, not ours."

"Johnny's violin playing reminds me of Paderewski."

"That's strange; Paderewski was never a violinist."

"Neither is your Johnny."

Sentry: "Halt! Who goes there?"

Belated soldier: "Hitler."

Sentry: "Orderly officer wants you. You're late for kampf."



"Who the so-and-so spread the butter on this 'ere bread, Sarge?"

"I did—and what abaht it?"

"That's O.K. Sarge! What I want to know is—who scraped it off again?"

BRAIN TEASERS

To begin with this month we have a puzzle in which one word only is concerned. This begins and ends with D and the problem is to fit such a word into the diagram below, in which the X's represent the missing letters. It will then appear 12 times.

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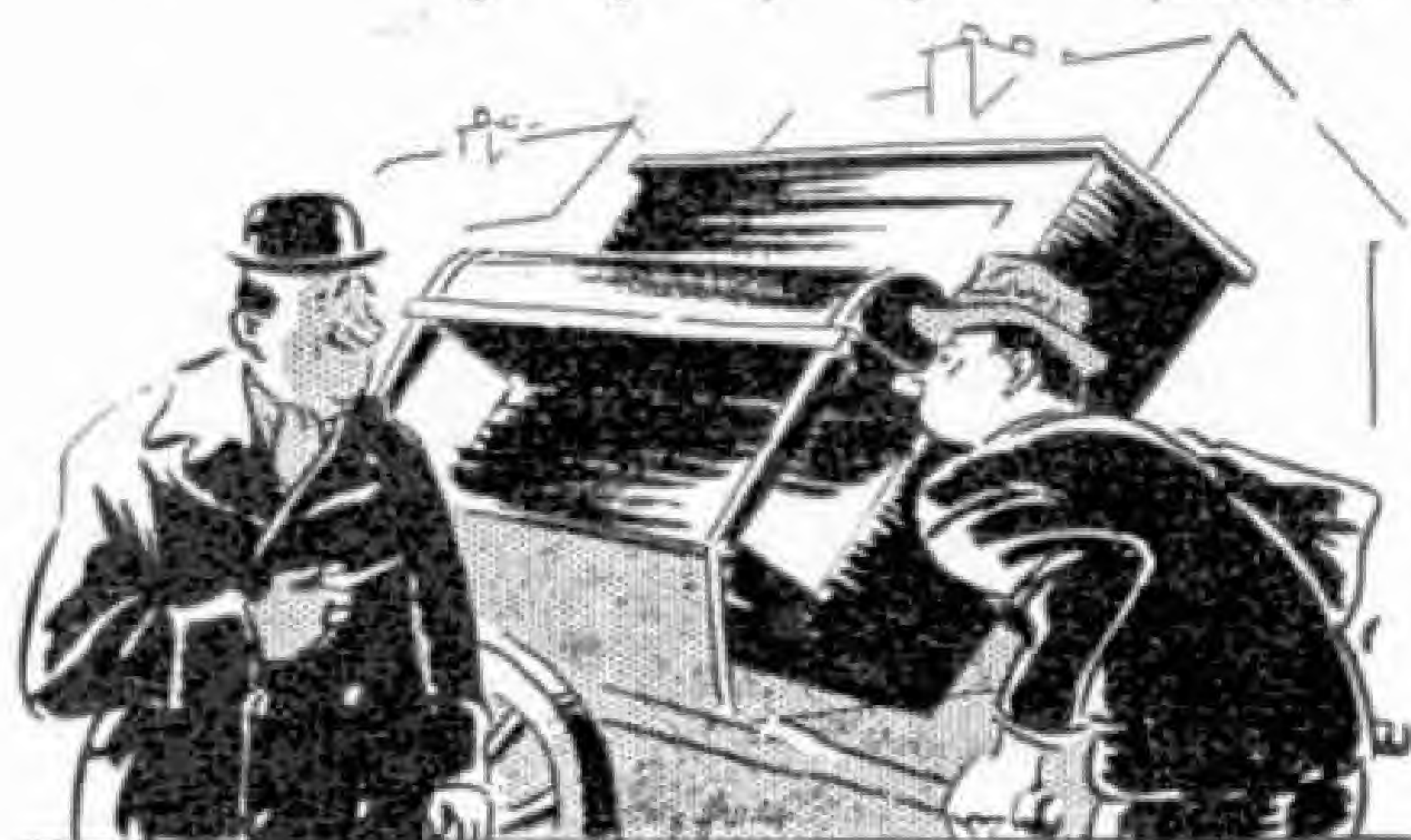
D X X X X X D
X X       X X
X   X   X   X
X       X   X
X   X   X   X
X X       X X
D X X X X X D
  
```

(C.B.D.)

SLOW MOTION

Those of you who have watched a snail crawling along the ground will not describe it as a fast mover; an inch a minute is perhaps a good rate for it. This was the speed at which an ambitious snail climbed the trunk of a small tree to a height of 12 ft., in a spiral course that took it 12 times round the tree. The circumference of the trunk was 5 in. How long did the snail take to reach its greatest height?

(T.K.C.)



"Fed up with it, already?"

"Don't be an idiot. I'm going for my music lesson!"

SOLUTIONS TO LAST MONTH'S TEASERS

Practically all readers would realise that the solution of the first puzzle given last month is as follows:

"Wise you are, wise you be."

I see you are too wise for me."

There must be many similar puzzles of this kind, and readers are invited to send along any that they know.

Noting that L must represent 1 and J must stand for 0 gives a good start to the crazy division sum that formed our second brain teaser. From this it is simple to proceed, step by step, to the following result:

9815)11827075(1205

9815

20120

19630

49075

49075

.....

The well-known aeroplanes of which jumbles were given in our third problem are: "Lancaster," "Fortress," "Mustang," "Stirling," "Manchester" and "Liberator."

THIS MONTH'S HOWLER

Turbines are what the Indians wear on their heads.

Boys

That Bike your Daddy bought for you is priceless to-day!

Take every care of it and remember, however efficient it may be, in the Black-out period which lies ahead, without effective Lighting Equipment, its usefulness will be reduced enormously!

And then remember—



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Binding cases for the 1942 "M.M." can be obtained from Messrs. O. H. Bateman and Co., 23, Hanover Street, Liverpool 1. They are supplied in what is known as Quarter Basil, full cloth, and are tastefully embossed in gold with the name "Meccano Magazine." On the back is the name and volume number. Price 6/6 post free.

These binding cases are supplied so that readers can have their Magazines bound locally, but where desired the firm mentioned above will bind the twelve issues of the 1942 "Meccano Magazine" at a charge of 10/- including the cost of the binding and also return carriage. The covers of the Magazines may be included or omitted as required.

Binding cases for the larger size of the "M.M." prior to 1942 are still available price 5/- for six issues and 7/3 for 12 issues. The complete cost of binding these issues is 7/6 for six copies, and 10/- for 12 copies.

CIGARETTE CARDS

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All cards in perfect condition. Postage extra: 2 1/2d. first set and 1d. each additional 50 cards. Send 3d. for my 1942-3 list of sets and odd cards.

R. W. HOUSTON, BCM/EXCHANGE, W.C.1

STAMP ADVERTISEMENTS

(Continued from pages 102 and 104)

K.G.VI SHORT UNUSED SETS ON APPROVAL

Thousands of these sets have already been sold to readers and their friends. If you have not yet seen them, here is another opportunity to do so. Although in sets, most of the stamps are priced singly, the majority from 1d. to 5d. each. Discount is given and postage paid each way. About 6 sets sent each time together with many other stamps that are sure to appeal. A postcard will bring the first selection.

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BARNET & FORD

The Stamp Shop, 5b, High Street, CONWAY, N. Wales

NEW FREE NORWEGIAN SET 6 comp. m. 2/6.

Morocco Agencies. Ed. VIII comp. used 3/6. G.B. 2/6 (Brown) 1/- Mozambique. 1892-3 set used 1/9, 10 Air-Mail Triangulars comp. 1/6. Liberia. Packet 50 diff. cat. 56/-—10/- 1906 \$2, cat. 16/6 at 3/6. 1918 \$2 at 1/- \$5 cat. 15/- at 2/6. \$5 "OS" cat. 15/- at 2/6. NEW COLOURS. M. Australia comp. set of 7 values 2/- Ceylon 5c. 2d. Gibraltar 1 1/2d.—3d. SUDAN. Gordon 5m., 10m., 2p., 5p., fine used 4/6.

FREE Set of Perak FREE MALAYA FREE

To all applicants requesting approvals a short set of G.V Perak Malaya stamps will be sent absolutely free together with a latest New Issue. Send a postcard at once and secure these valuable stamps. Liberal discount on purchases off approvals.

Martin Courtney (Dept. MM), 36, Albert Street, Warwick

DID YOU MISS IT?



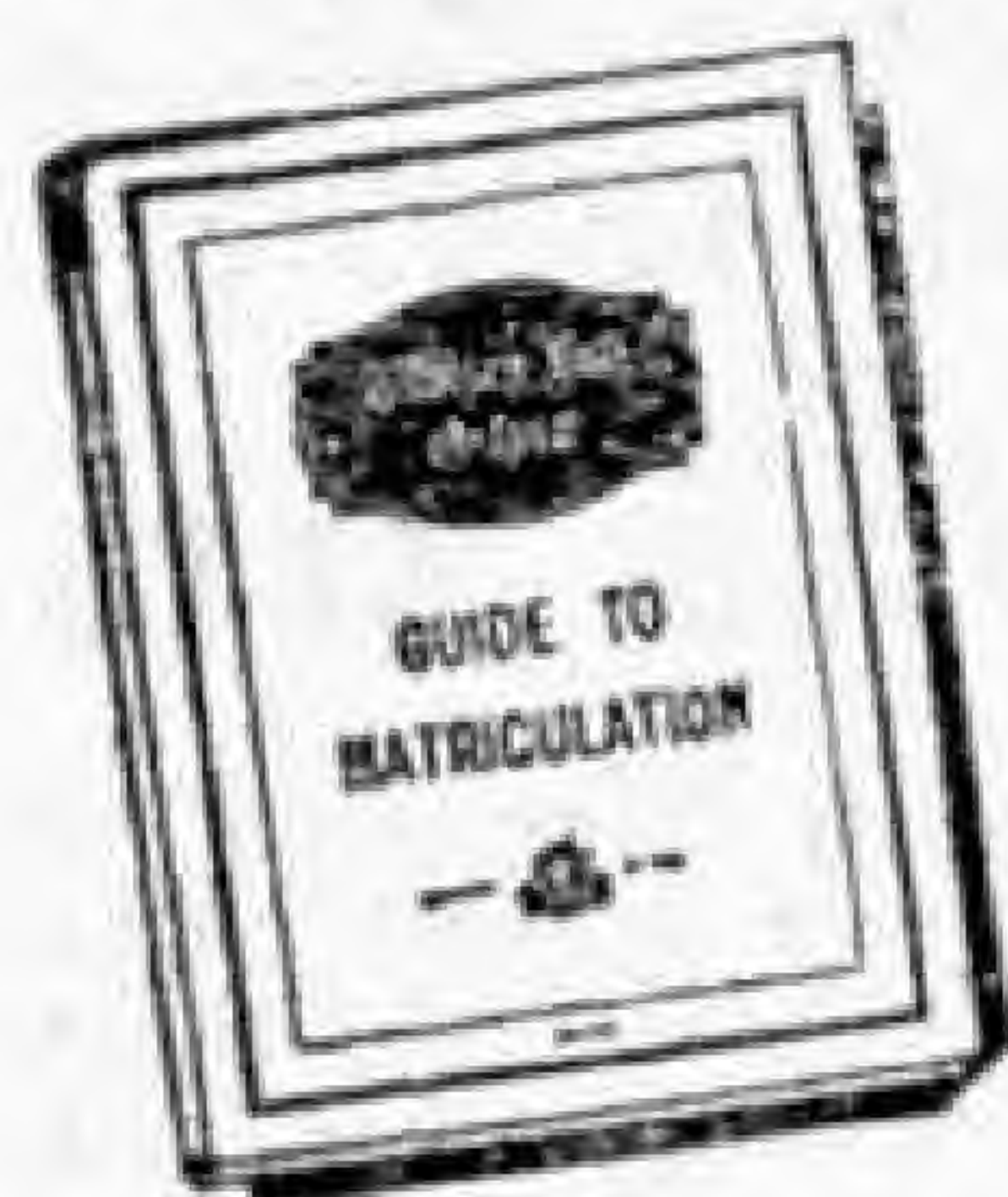
One of these "Bantam" stamps is included in our African packet which we advertised last month. Normally 1/6, we are offering this splendid packet for 5d. plus 2 1/2d. postage (7 1/2d. in all), to new customers requesting approvals. Space does not permit full

description, but packet includes Tunis, new issue for Belgian Congo, Triangular, Airm, and other fine stamps, catalogued nearly 2/6. If you missed our offer last month don't delay this time. Send 7 1/2d. in mint stamps to-day to: CAPT. M. CAMPBELL & CO. (Dept. MM), 15, North West House, West Street, BRIGHTON.



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RHEOSTATS, or 6 to 12 volt Dimmers Controllers, 0 to 1 ohm and off, for up to 3 amps., for model or charging circuits. Hollow knobs with bulb socket for live glow. U.S.A. Aetna 5/- line for 2/6.

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Building Contracting	Motor Mechanic
Business Training	Moulding
Business Management	Patternmaking
Cabinet Making	Power-House Attendants
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Diesel Engineering	Steam Engineering
Draughtsmanship	Structural Steelwork
Drawing Office Practice	Surveying
Electrical Engineering	Telegraph Engineering
Engineer in Charge	Telephone Engineering
Eng. Shop Practice	Templating
Fire Engineering	Textile Designing
Fitting and Turning	Toolmaking
Foundry Work	Turner
Garage Management	Welding, Gas & Elec.
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Ground Engineer	Woollen Manufacturing
Heating and Ventilating	Works Engineering
Hydraulic Engineering	Works Management

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Readers' advertisements are published as soon as possible; inclusion in the first issue after receiving them cannot be guaranteed.

Small Advertisements. 1/8 per line (average seven words to the line), or 20/- per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

READERS' SALES AND WANTS

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"Meccano Magazines" bound, 1936, 1937, 1938, excellent condition, 7/6 each.—36, Severn Avenue, Weston-super-Mare.

Morse Learner's Set, complete 6/-; Bound Volume "Chums," 1898, with coloured plates, 10/-.—Giles, 145, West Street, East Grinstead.

Hornby Clockwork Model Railway in good condition, cheap for £3/15/-.—Stride, "Dawn," Yeomans Way, Totton, Southampton.

WANTS

January and March 1942 "M.M.'s"; clean.—Jennings, "Elmfield," Staverton, Wilts.

Webley Air Rifle, .177 in. or .22 in. Bore, with Ammunition if possible; must be in first-class condition. Particulars to—B. Labbett, Rowanden, East Farndon, Market Harborough, Lincs.

Hornby Dublo Clockwork Points; perfect working condition essential; good prices paid.—Richbell, 15, Nicholson Crescent, Morecambe, Lancashire.

Hornby Electric Locomotive, gauge "0," Lincs. Accessories, Transformer, Rolling Stock. Will buy separately.—Gittus, "Lynwood," Birmingham Road, Alcester, Warwickshire.

Trix Southern Electric Set; good condition. State price.—Capon, 84, Bulstrode Avenue, Hounslow, Middlesex.

"Meccano Magazines" 1940, Nos. 1, 6, 10, 11, 12; 1941, Nos. 1, 2, 5, 12; 1942, No. 9; good condition.—A Dowling, "Northview," Rawreth Lane, Rayleigh Essex.

Meccano T20A Transformer, E20b Electric Motor, and Pinions, Gears. State price.—Middleton, Allandale, West View, Mold, Flintshire.

Hornby gauge "0" Clockwork Engine.—Wilson, c/o Royal Netherlands Government, Pinners Hall, Gt. Winchester Street, E.C.2.

"M.M.'s" January and July 1942, good condition only. Meccano Parts: 2 No. 30, 2 No. 31, 4 No. 51, 1 No. 144; 2 No. 171, 1 No. 216. Must be in good condition. If more for sale send list to F. Robertson, "Mount Carron," Carron, Falkirk, Stirlingshire, Scotland.

Geared Roller Bearing, Part No. 167, complete; Helical Gears, Part Nos. 211a and 211b. Also Super Model Leaflets Nos. 1, 16, 18, 20, 37.—Trevor, 2, Oakfield Terrace, Cuckoo Lane, Gateacre, Liverpool.

No. 2 Special Clockwork Tender Locomotive (S R), very good condition; state price.—Halliday, The Plains, Calverley, Nr. Leeds, Yorks.

WANTS (continued)

"Picturegoers," in good condition. State dates and prices to—Grenshaw, Woodlands, Luddendenfoot Halifax, Yorks.

"Magnets" and "Gems," any dates prior to 1941. State prices.—P. Miles, 12, Anne Way, Barkingside, Ilford, Essex.

Hornby Dublo Rails EDA2 Large Radius Curves; EDA14 Half Curves; EDBS Short Rails; also Points, Locomotive and No. 1 Controller. State price.—Hannam, 50, Windsor Street, Colne, Lancashire.

Will exchange Bingscope, hand-driven, battery-operated Cinematograph complete with Films, and small Chessmen—for Meccano Outfit No. 8 with Clockwork Motor.—Roberts, Tegfan, Brynford Road, Holywell, Flint.

January 1941 and August 1942 "M.M.'s"; good condition.—Fenna, Newlands Avenue, Cheadle Hulme.

200 Meccano Nuts, 200 Bolts, Five Railway Wheels, Eight 1 in. Diameter Pulleys; state price.—Stride, "Dawn," Yeomans Way, Totton, Southampton.

Wanted badly. Red/Green Instruction Manual 4 to 7 in any condition, also books of New Models and Leaflets No. 4, 15, 16, 19, 27, 28, 30. any reasonable price paid.—Alderslev, 40 Pembroke Street, Skipton.

Dublo Tank Locomotive. Clockwork, L.M.S. or L.N.E.; good condition. State price required.—Payne, High Street, Doddington, March, Cambs.

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